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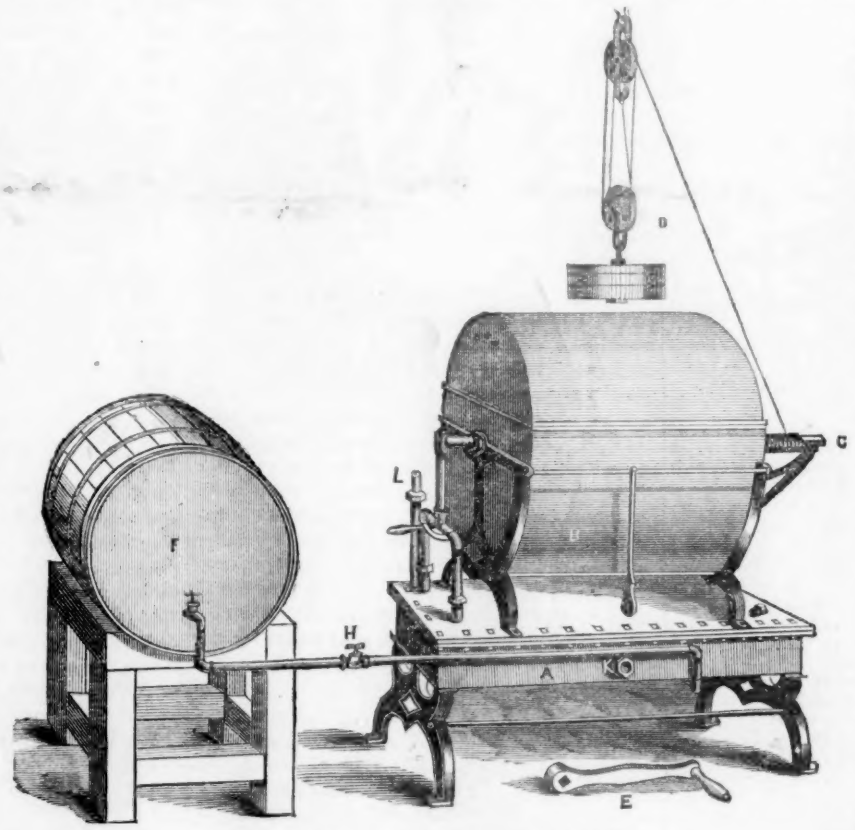
The Solar Gas Machine.

We present herewith a view of the simplest, strongest, safest and least capable of derangement, of the numerous Petroleum Gas Machines before the public. The storage cask is represented in connection with the machine. The reader will conceive the connecting pipe sufficiently extended, and the main stock of oil stored at a safe distance from the building. The machine, containing not necessarily more oil at one time than an ordinary domestic set of lamps with can, and that oil enclosed in an air tight and massive iron tank (A), made as strong and close as a steam boiler, with strong iron pipes and screw connections, no part soldered or of soft or thin metal—becomes evidently the safest mode of keeping the usual domestic supply of petroleum that ever has been or could be adopted. When the handle of the guage-cock (seen projecting at right angles with the pipe, L,) is drawn around fully forward, all possible access to or egress from the tank, for air or gases, is closed; no explosive mixture can be formed, and nothing short of melting or burning out the iron plates of the tank in a conflagration such as would test an iron safe, can in any way bring the oil and fire together. It affords the *maximum* of safety for keeping and burning mineral oil in a dwelling.

The next point to be noticed by the reader is the simplicity of the little mechanism employed. This is all contained in the drum, B, which can be detached in a moment from the other parts of the apparatus, taken apart, cleaned, repaired and put together, as occasion may require, with very little trouble, and no difficulty at all. Nor is the mechanism likely to need such attention, unless at long intervals. There is nothing of it, save a simple drum wheel within the water drum, B, divided longitudinally into four compartments, with openings where they dip into the water successively by the revolution of the wheel, whereby the pressure of the water admitted forces the air in them through valves into the hollow shaft of the wheel, and thence through pipes into the hydro-carbonizer, or oil tank. The weight and compound pulley D, with its wire rope winding direct upon the shaft, C, constitute the whole mechanism of the motive power; dispensing with gearing and cog wheels, which, unless extremely nice in adjustment, are apt to act concussively upon the pressure, and produce a slight jumping or other irregularity of the flame.

The inside of the hydro-carbonizer, A, is divided by vertical partitions into a series of back and return flues or passages, or rather a single labyrinthine passage, through which the air forced in at one corner must find its way to its outlet, L, at another; passing all the way through and between suspended cloths which dip their edges in the oil and draw it up, so as to present a great aggregate of evaporating surface to the passing air. There are two admission pipes, as may be seen; one of which enters so as to send air throughout the entire internal passage, and the other so as to send it only through a small portion of the passage. The first pipe may be used alone by properly setting the cock, and the air will become strongly charged with vapor. If the weather is cold, or the oil heavy, or after the temperature has been reduced by evaporation continued for some time, and the evaporation has become slow, then this adjustment will be useful to keep up the illuminating power. In other circumstances this will yield too rich a mixture, which will smoke; and by re-adjusting the cock by the guage, any required proportion of the air may be shut off from passing through the whole of the oil, and the rest passed through the partial course. With light oil and warm weather, the latter will be sufficient alone. At fifty cents per gallon for the oil, the light of ten sperm candles is said to cost five-sixths of a cent per hour, or less than one mill per candle.

The machines are manufactured by O. P. Drake & Co., Boston, and sold in New York by Smite & Drake, 726 Broadway, where their operation can be witnessed at all times.



SOLAR GAS MACHINE.

Petroleum and Freezing Water.

At one of the Scientific Institutions of this city, says the *American Artizan*, Professor Van der Weyde explained the chemical composition of petroleum, and also made the experiment of freezing water in a vacuum. The Professor stated that the agents that have been used for this purpose are ether, ammonia, and liquid carbonic acid gas, but he had employed liquid petroleum gas with good results. This gas can be easily collected at the oil distilleries, as it is not at present utilized, and the whole expense would be the cost of collecting it. The Professor then poured water into testing tubes, placed these tubes in a wine-glass then poured a quantity of the petroleum gas into the glass, and placed the whole under the receiver of an air-pump; after exhausting the air and allowing the test-tubes to remain in the vacuum for a few minutes, they were removed and the water contained in them was found to be frozen quite solid. The Professor then stated that he thinks that ice could be produced at a less cost than that of collecting it in winter. His plan is to form two iron vessels similar to locomotive boilers, and fitted with tubes in the same manner. He would place the air-pump between the two vessels or reservoirs, so that the liquids or gases might be pumped from one to the other alternately as the ice was formed.

—The citizens of Schulkill county, Pa., have under consideration the erection of Bessemer steel works in that county. At a meeting in furtherance of the project, held in Schuylkill Haven, it was stated that $100,000 had already been subscribed. There are now only two Bessemer steel works in the country.

—For testing the different lubricating properties of oils and other lubricants an English inventor has contrived an apparatus whose principle depends on the amount of frictional motion necessary to produce a given temperature.

Study on Coal Tars and their Products.

EXHIBITED IN 1867.

By Professor H. Dussauce, Chemist.

[Translated for the American Gas-Light Journal from "Studies on the Exposition of 1867," published by Ecg. Lacroix, 15 Quaie Malaquais, Paris.]

II. Coal Tar—Treatment.—(*Continued.*)

In the manufactory of the Parisian company, in which the distillation is made on a large scale, these heavy oils are collected in large sheet iron receivers, until they are put into barrels for shipping. As for the first and second products they are sold directly to manufacturers of aniline.

The treatment of the tar we have indicated, is applied principally to products rich enough in volatile oils, and which permit to make that fractioning in three parts of the condensed oils. But there are some tars so poor, that two fractionings are sufficient; all the oils up to 360° on one side and the heavy oils on the other. Indeed, there are some tars which do not give one per cent. of benzine and some others which produce five per cent.

To understand well the sequel of this work it is necessary to give some theoretical details on the compositions of the volatile products disengaged from tar by distillation. These products contain many organic bodies that chemists have isolated, and the number of which increase every year.

But, in the composition of all these oils, liquid and solid, it enters only four simple bodies—carbon, hydrogen, oxygen and nitrogen combined in different proportions. These combinations are already to the number of 25 well known and several not much studied. They are divided in three parts.

1. Acid products composed of carbon, hydrogen and oxygen.

2. Alkaline products composed of carbon, hydrogen and nitrogen.

3. Neutral products and hydrocarbons composed of hydrogen and carbon.

The following is the table of all those products studied until now:

Table No. 1.

Volatile Products from the Distillation of Coal Tar.

	Composition.	Density, 1° Acid prod.	Boiling Point.
Phenic acid....	$C^{12}H^5O+HO$	1.065	370°4
Rosolic " .. }	They accomp any the phenic acid in		
Xylic " .. }	small proportions.		
	2d. Alkaline products.		
Anilin.....	$C^{12}H^7N$	1.028	359°6
Quinolein.....	$C^{18}H^7N$	1.081	446
Pyridin.....	$C^{10}H^5N$	..	302
Lutidin.....	$C^{14}H^9N$	..	309.2
Lepidin.....	$C^{20}H^9N$	..	500
Collidin.....	$C^{16}H^{11}N$	0.921	354.2
Petinin.....	$C^8H^{11}N$	..	176
Pyrrhol.....	..	..	..
Picolin.....	$C^{12}H^7N$	0.955	271.4
Cryptidin.....	..	..	..
Panvolin.....	..	..	..
	3d. Neutral products or hydrocarbons.		
Benzin.....	$C^{12}H^6$	0.850	177°8to188°6
Toluen.....	$C^{14}H^8$	0.870	221 to 230
Cumen.....	$C^{18}H^{12}$	..	303.8
Xylen.....	..	..	260.6
Cymen.....	$C^{10}H^{14}$	0.861	347.
Naphtaline.....	$C^{20}H^8$	1.048	422.6
Para naphthaline	$C^{30}H^{12}$	..	570.
Anthracen.....	$C^{18}H^{10}$	..	above 570
Chrysen.....	$C^{82}H^4$	..	..
Pyren.....	$C_{30}H_{12}$	..	..
Eupion.....	C H	..	336°2
Propylen.....	C^6H^6	..	volatile
Butylen.....	C^8H^8	..	..
Amylen.....	$C^{10}H^{10}$	..	102.2

By the inspection of this table we see immediately that science indicates several processes to separate them, at least as completely as necessary for industry.

Table 2.

Products Distilling up to 302°.

First fractioning:
- Amylen boiling at..... .....102°2.
- Benzin " " ... .177.8 to 188°6.
- Petinin " " .....176.
- Toluen " " .....219.2 to 226.4.
- Xylen " " .....260.6.
- Picolin " " .....271 4.
- Pyridin " " ....302.

From 302 to about 392°.

Second fractioning:
- Cumen boiling at.....303°8.
- Lutidin " " .....309.2.
- Eupion " " .....336.2.
- Cymen " " .....347.
- Collidin " " ... .354.2.
- Anilin " " .....359.6.
- Phenic acid " .....370.4.

Above 392°.

Third fractioning—heavy oils:
- Naphthaline boiling at.....422°6.
- Quinolein " " .....462.2.
- Lepidin " " .....500.
- Para-naphthaline " .....570.
- Anthracen, above.....570.
- Chrysen..... —
- Pyren, etc., etc ..... —

Evidently, in practice, this classification is not absolute, the naphthaline, by example, which is easily carried off, is found in the second and even in the first fractioning.

The inspection of the first table indicates a second way of separation; energetic mineral acids will take off the organic alkalies, and potash and soda permits us to separate the acids. Let us see how they apply in industry these three ways of purification.

1st. Difference in the boiling point.

2nd. Use of energetic acids.

3rd. Use of energetic alkalies.

Purification of the Oils of Tar and Separation of the Different Products.

In the present state of the industry, we have not to study the oils of the third fractioning, but as we are progressing all the while, it is very probable some means will be found to utilize them better.

The products of the first and second fractionings are the only ones which are bought for the shops where the purification and separation are effected.

Treatment of the first Fractioning Oils up to 302°.

In the distillation of tar these oils are in weak proportions: thus, by this reason, a part of the oils of the second fractioning are found in the first. It is important then to make the first rectification on a certain quantity after separating the water. This rectification is made in a cylindrical boiler, containing from 2,000 to 4,000 lbs. of oils. If heated by coal the heat must not be direct; the hearth must be surmounted with a vault. The boiler can also be heated by steam under pressure, by means of a double bottom. The distillation in every case ought to be made very regularly, until two-thirds of the contents are volatilized; the condensation is effected by ordinary means.

The residuum in the boiler is re-united to the products of the second fractioning, after separating the naphthaline, which generally deposits by cooling. The two-thirds rectified contains principally

- Amylen boiling at .....102°2.
- Petinin " " ....176.
- Benzin " " .....177.8 to 188.6.
- Toluen " " .....219.2 to 226.4.
- Xylen " " .....260.6.

And a small quantity of all the other products less volatile, and probably some hydro-carbons yet unknown.

The amylen, or alcohol of tar, can be immediately separated by putting aside the first products of the distillation and be added afterwards to the benzines made for cleaning; this product is in small proportions. The balance of the oils is collected in a receiver in which water separates by resting, then they are submitted to methodical washings, the object of which is to take off the ammonia and its combinations, then the organic alkalies and acids.

The treatments are as follows:

1. Washing with pure water to take off ammonia and its salts settling and decanting.

2. Cold washing with three or four per cent. of sulphuric acid, which dissolves the basic products and carry off a little naphthaline and impurities. The mixture must be made energetically, then allowed to settle for twelve hours. The acid tar completely deposits and the oil swims; the tar is drawn off from the bottom and the decanted oils are received in a third vessel.

3. Washing with pure water, settling and drawing off the water.

4. Second washing with pure water, settling and decanting in a fourth vessel.

5. Cold washing with 1 to 2 of caustic soda at 36° to take up the last traces of sulphuric acid, and the organic acid contained in the tar. Good stirring, settling for 12 hours, separation of the soda combined with the acids.

6. First washing with pure water and settling for six hours.

7. Second washing with pure water, settling for six hours, decantation of the oils, the chemical treatment of which is achieved.

The vessels used in this operation are generally of cast iron of a cylindrical form. To facilitate an energetic washing the operation must be made with 600 or 800 lbs. at the most. In large manufactories the vessels are disposed in steps, so as to decant from one to the other.

We cannot too much recommend to have the washings well done; the vessels should be kept clean and always used for the same operation; that they be hermetrically closed to avoid the loss of the very volatile oils. The oils thus treated are immediately introduced in sheet iron receivers well closed; they contain only the neutral hydrocarbons with a boiling point very little elevated, that is the benzin, toluen, xylen, a little cumen, and other neutral oils. They are left to settle until limpid, then they are drawn off and submitted to a second rectification in very clean retorts, of a capacity of 600 to 800 pounds. The heating is not direct; they use either steam under pressure, or a bath formed of palm oil, in which the retort is to be dipped, but in both cases the direct action of fire is avoided. To obtain colorless oils the head of the retort must be of copper tinned inside, and the worm made of tin. The retort is necessarily provided with a thermometer passing through a cock closing a tubulating in such a manner that the bulb dips entirely in the vapors. This thermometer is a guide for the rectification, which must be made very regularly and without jolts. In manufacturing they generally collect the benzin and toluen together; in this case they fraction all that passes to the distillation until the thermometer marks 230°. This mixture constitutes the benzin or benzol used to manufacture the oil of mirbane, anilin and colors derived from it. The products which condense afterwards are very white and very limpid naturally; they contain yet traces of benzin and toluen, but principally xylen, cumen, and probably some hydrocarbons yet unknown. Those products, collected from 230° to 260°, are set aside and are used to clean cloths, dissolve india-rubber, and other industrial applications. Above 260° a third fractioning is made, and it constitutes a second quality of the above products, and is improperly called benzin.

When these three products have been collected—

1. Mixture of pure benzin and toluen.
2. Benzin to clean No. 1.
3. Benzin to clean No. 2,

And that the condensed oils are not very limpid nor very white, the residuum left in the retort drawn off while cold, is mixed with the products of the second fractioning. As for the three products collected above, they are immediately introduced in sheet iron receivers, from which they are shipped.

(To be continued.)

—A mammoth cave in southern Illinois is reported to rival the famous Kentucky cave, and to exceed in length any others yet discovered. It has been partially explored a distance of three miles, but a thorough search through it has never been instituted. Some years since two men got lost in its passages, and after three days of unceasing travel emerged into the open air thirteen miles distant from the place where they entered.

Chemistry, as Applied to the Manufacture of Coal Gas.

BY DR. FRANKLAND, F.R.S., F.C.S., ETC.
Professor of Chemistry at the Royal Institution.
REVISED AND EXTENDED FOR THE FOURTH EDITION,
BY DR. ATTFIELD, F.C.S.,
Director of the Laboratories of the Pharmaceutical Society of Great Britain.
[From "Clegg on the Manufacture of Coal Gas."]

Carbonic Acid.—This gas is always generated when carbon is burnt in an excess of air or oxygen; it is formed during fermentation, putrefaction and decay, and in small quantity during the earlier stages of the decomposition of coal in red-hot retorts; it is also a product of the decomposition of water by carbon at a red-heat.

Carbonic acid differs strikingly from carbonic oxide in its properties, though it only differs in constitution by containing double the quantity of oxygen, that is, twelve parts of carbon and thirty-two parts of oxygen. Carbonic acid is pungent, acidulous, and soluble in an equal bulk of water, to which it communicates that briskness which we relish in soda-water; it is considerably heavier than atmospheric air, its specific gravity being 1·524. This gas is uninflammable, and cannot support combustion or animal life. Its acid properties are not strongly developed, but it unites readily with alkaline bases, forming carbonates. It is upon this property that the removal of carbonic acid from coal gas depends. On passing coal-gas containing this acid through slaked lime in fine powder, or through milk of lime, the whole of the carbonic acid disappears, having united with the lime.

Quicklime, slaked in such a manner as to be neither dust-dry nor very perceptibly moist, is most effective for the absorption of high percentages of carbonic acid, a layer one inch in thickness not allowing a trace of the acid gas to pass through it.

The presence of even a small percentage of carbonic acid in coal-gas is much to be deprecated, on account of the loss of light which it occasions; one per cent. of carbonic acid diminishing the illuminating power of coal-gas to the extent of about six per cent. The addition which it makes to the carbonic acid produced during combustion is too minute to be of any importance.

Light Carburetted Hydrogen.—This compound, which is also known to chemists under the names of *marsh-gas*, *fire-damp*, and *hydride of methyl*, is always a constituent of coal-gas; it is also a natural product of the slow decomposition of coal, and of putrefaction in general. Thus it occurs in enormous quantities in the coal strata, and bubbles up from stagnant pools and ditches which contain putrefying organic remains. As thus generated, it is mixed with small quantities of carbonic acid and nitrogen; it can however be artificially prepared perfectly pure, but the processes need not be described here.

Light carburetted hydrogen is colorless, tasteless and inodorous; it is neutral to test-papers, and nearly insoluble in water; its specific gravity ·5594, is and 100 cubic inches at 60° Fahr. and 30 inches barometric pressure weigh 17·4166 grains. It does not support combustion or respiration, but is inflammable, burning with a blue or slightly yellow flame, yielding scarcely any light. Mixed with a due proportion of air or oxygen and ignited, it explodes with great violence; the products of its combustion are water and carbonic acid. One cubic foot of light carburetted hydrogen at 60° Fahr. and 30 inches barometric pressure consumes two cubic feet of oxygen and generates one cubic foot of carbonic acid; during combustion it yields heat capable of raising the temperature of 5 lb. 14 oz. of water from 32° to 212°, or that of a room containing 2500 cubic feet of air from 60° to 80·8°.

When light carburetted hydrogen is exposed to a white-heat it is slowly decomposed, depositing carbon and yielding twice its volume of hydrogen.

Olefiant Gas.—This gas, also knows as Ethylene, is rarely met with in nature, but as it is generated in great abundance when coals or other bituminous matters are exposed to high temperatures, it might be expected to occur where any coal-bearing strata are exposed to volcanic heat, and has in fact been occasionally met with as a natural product under those circumstances. Olefiant gas nearly pure can be prepared artificially by heating in a suitable glass retort a mixture of one part by weight of alcohol and five or six parts of concentrated sulphuric acid; the gas should be passed through a solution of caustic soda to remove the sulphurous acid and carbonic acid with which it is generally contaminated.

Olefiant gas is colorless, and possesses a peculiar and somewhat unpleasant odor; its density is ·9784; 100 cubic inches at 60° Fahr. and 30 inches barometric pressure weigh 30·3418 grains. It consists of two volumes of carbon vapor and four volumes of hydrogen, the six volumes being condensed into two; it therefore contains in a given bulk exactly twice as much carbon as light carburetted hydrogen. Olefiant gas is inflammable, but does not support combustion. When inflamed as it issues from a jet into the atmosphere it burns with a large white flame, emitting a very brilliant light without smoke. During its combustion it consumes three times its volume of oxygen, and generates twice its volume of carbonic acid. Passed through a red-hot tube, or otherwise exposed to a full red-heat, it is rapidly decomposed, carbon being deposited, and hydrogen and probably light carburetted hydrogen produced. By being thus treated its illuminating power is entirely destroyed. Olefiant gas is probably always present in coal-gas, and contributes greatly, though not exclusively, to its illuminating power.

Though sulphuric acid can dehydrate alcohol and give olefiant gas, it can, under proper conditions, hydrate olefiant gas and give alcohol. This fact, first thoroughly worked out by Berthelot, has been practically applied by MM. Castex and Cotelle to the production of alcohol from coal gas, the impoverished gas being subsequently used for heating purposes. The enormous expense attending the process divests it of economic importance.*

Acetylene.—Of all hydrocarbon gases this is at once the most stable and poorest in hydrogen; and unlike them, high temperature is favorable instead of inimical to its production. Indeed, Berthelot has succeeded in forming it synthetically by passing the electric spark from carbon pole in an atmosphere of hydrogen, the highest temperature man is able to produce. Two volumes of it contain two volumes of carbon vapor and two of hydrogen. It may be detected in and abstracted from coal-gas by passing the latter through a solution of subchloride of copper in ammonia, when it collects as a brick-red compound, termed acetylide of copper. On adding hydrochloride acid to the copper salt pure acetylene is evolved as a colorless gas of disagreeable odor. Acetylide of copper is a body that explodes on being heated, rubbed, or struck. It has been the cause of accidents where coal-gas has been continuously passed through copper tubes.

Hydrocarbons.—This name has been applied to a very large number of compounds formed principally by the destructive distillation of organic bodies, and composed of carbon and hydrogen united together in various proportions. Some of these compounds are gaseous, others liquid, and several solid. Their history is at present very imperfect, their composition and properties having been very little examined. We will notice only the most interesting of this exceedingly numerous class of bodies.

Gaseous Hydrocarbons.—The hydrocarbons which exist at the ordinary temperature and pressure of the atmosphere in a gaseous form are of the utmost importance to the gas manufacturer; indeed, the manufacture of gas for illuminating purposes has for its principal object the production of the largest amount of gaseous hydrocarbons from a given weight of material. The gaseous hydrocarbons of known composition which have been proved to be present in coal-gas are the three just described under the names of light carburetted hydrogen, olefiant gas and acetylene; there are, also, in addition to a host of unknown ones, at least two others, whose composition and properties have been investigated—these are propylene and butylene. The first is produced artificially by passing the vapor of fousel oil through a red-hot tube; and the second, which is present in oil-gas, is generated during the electric decomposition of valerate of potash. Both these gases are colorless, possess a slight ethereal odor, and burn with a bright brilliant flame, having an illuminating power much greater than that of olefiant gas; they are rapidly decomposed when subjected to a red heat. Propylene consists of three volumes of carbon vapor and six volumes of hydrogen, the nine volumes being condensed into two: it hence contains 50 per cent. more carbon in a given volume than olefiant gas. Its specific gravity is 1·4511. Butylene consists of four volumes of carbon vapor and eight volumes of hydrogen, the twelve volumes being condensed into two; it therefore contains double the amount of carbon present in an equal volume of olefiant gas. Its specific gravity is 1·9348. Both propylene and butylene are condensible to the liquid by cold and pressure.

As the illuminating power of these gaseous hydrocarbons is directly proportionate to the amount of carbon contained in a given volume, the illuminating values of olefiant gas, propylene and butylene, must be as 1 : 1·5 : 2.

Liquid Hydrocarbons.—These make up the great bulk of the tar produced in the process of gas-making, and compose the naphtha and coal-oil obtained by the distillation of tar. The more volatile of them diffuse their vapor into the gas itself, and thus contribute in no inconsiderable degree to augment its illuminating power. This they do by reason of the large quantity of carbon which a given volume of their vapor contains, and which may be seen by the diagram [published in our issue of August 2d.] The number of these hydrocarbons is very great, but a few only have been investigated; we will direct attention to one or two, which are, or promise to become, of great importance.

(To be continued.)

* We understand a process has been discovered whereby alcohol can be made from coal exceedingly cheap, and that a company is formed and operating with great success in Paris. It is thought it will have the effect to make the market value of alcohol very cheap. —Eds.

Manufacture of Steel.

An invention has recently been patented by Mr. V. Gallet, of Lavasseau de Benassais, France, the object of which is to facilitate the manufacture of steel. He proposes to take iron, by preference such as has been submitted to one rolling operation only—puddle bar—and to coat it with a paste made by mixing water with the following ingredients: carbonate of lime, 37 parts; vegetable mould or clay, 13 parts; carbonate of potash, 19 to 20 parts; oxide of manganese, 3 parts; resin, 3 parts; soot, 10 parts; wood charcoal, 40 parts; and common salt 1 to 3 parts. The iron coated with this composition is melted in a crucible, and cast steel is thus obtained from iron in one operation. The proportions in the composition may be varied, and the vegetable mould and the soot may be omitted.

In order to prepare steel by the process of cementation he employs the same composition in a dry state (or it may be moistened), and conducts the process in the manner usually practised in preparing steel by cementation. The quantity of cement necessary to coat the fragments of iron varies from two to seven per cent. of the weight of the iron, according to the nature of the iron and the quality of the steel that it is wished to obtain.

The object of the invention in the case of cast steel is to supersede cementation in furnaces to purify the iron, and to combine it chemically with wood charcoal by the cementation which takes place in the vessel in which he makes the steel. Charcoal having very little affinity for iron requires, in order to cause it to enter into intimate combination with it, to be increased at a stated time, and to be aided in its combination by numerous electric currents; these conditions Mr. Gallet claims to have entirely fulfilled by his process, since, firstly, the mutual reaction of the carbon and the carbonates produces a greater proportion of carbon and takes a smaller determined proportion: and secondly, the change of the carbon and the carbonates, the action of the hot iron upon the resin, and the aluminous oxides of potash at a stated time, engenders or produces numerous sources of electric currents; ultimately the alkaline metals appear at a stated time, and absorb with avidity phosphorous sulphur and other metalloids. The alkaline and earthy bases pass to the scoria.—*Railroad and Mining Journal.*

Water Supply of London.

[From the London Journal of Gaslighting.]

The water supply of London has for some years attracted increased attention. With the advance of social civilization there is more generally diffused demand for social comforts, one of the first of which is an ample supply of pure water. While medical investigation has made us almost as critical about our water as our wine, the advances of population and the general use of one of the mechanical aids of domestic luxury, have befouled numerous once pellucid streams. To the discussions that have arisen there are, of course, three parties: The vested interests and stolidly indifferent, who believe that "everything is for the best in the best possible of worlds," and denying the necessity of any change; the mad doctors and their pupils who would drive us back to rain water, filtered under *their* auspices, whose sanitary regulations would make us all worse off than Sancho Panza, during his brief government of Barataria; and the reasonable men, who know that reasonable precautions and a reasonable expenditure will give the inhabitants of the metropolis all that is required for health and cleanliness. The possible effect of impure water on the spread of cholera has had its result in stimulating the demand for inquiry into the whole subject. It was under these circumstances that the East London Thames Supply Water Bill, having been read a second time this session in the House of Commons, was referred to a committee, with instructions to "inquire into the operation and results of the Metropolis Water Act, 1852." The report of this committee is, in fact, a summary of the legislation on the subject, and also of the demands likely to be made and enforced on the water companies. The school of philosophers who find every thing in the shape of sanitary arrangement wrong, and who wish, like the great pensioned C. B., to introduce an entirely new system of doing everything of an engineering character, entirely forget, when treating of the metropolis, that the sanitary appliances of that vast population have grown with its wants, and were, therefore, fifteen years ago, open to an amount of criticism which could not be directed to towns provided with spick and span new arrangements, devised with the benefit of at least a century of experience.

Within the memory of living men, Nottingham, Birmingham and Glasgow have been dependant on water carts and wells for a daily supply of water. London began early to bring water to the door of the majority of its inhabitants. The water companies, whose enterprise provided the comfort of a house supply, did not go to the nuisances that have deteriorated some of their sources. The nuisances grew round them, while public taste, educated, became, fortunately for public health, more nice. The committee have taken this rational view, as will be seen from the following summary of the principal points of their report: The several companies, established for the purpose of supplying the inhabitants with water, began with competition, and finished, as great companies always must, with a coalition, for equal rates and separate districts. Soon the consumers complained of the monopoly, and in 1821 a committee of the House was appointed to inquire into the whole subject of the water supply of the metropolis. This committee, after pointing out that the inhabitants of London were better supplied with water than those of any other city in Europe, recommended that an act should be passed prescribing the maximum rates to be charged by the companies, and enforcing arrangements to prevent waste of water. But the time of political apathy preceding a political storm was not favorable to general and comprehensive legislation. In 1828 an alarm arose, with ample foundation, that the water then drawn from the tidal waters of the Thames was unwholesome. A Royal Commission was appointed to ascertain the sources and means of supply, the quality of the water, and to find out, if necessary, new sources of supply. The Commission reported that as the water of the Thames approached the metropolis "it became loaded with filth." This report was referred to a committee of the House of Commons, which recommended that Mr. Telford should be employed to prepare a scheme for supplying the whole of the metropolis with wholesome water. Legislation marched slowly in those days. In 1834 Mr. Telford recommended that the southern part of the metropolis, then supplied from the Thames, should be supplied from the river Wandle, and the northern part from the river Colne. This report was referred to a select committee, which, in consequence of the lateness of the session, merely reported the evidence to the House. The question rested for six years, until in 1840 the House appointed a committee and took evidence without reporting on the metropolitan water supply. In 1849 an outbreak of cholera again called attention to the water of London. The Board of Health, then newly appointed, and under the guidance of Mr. Edwin Chadwick, reported entirely against the existing system of supply, and on the evidence of a young officer of the Royal Engineers, proposed an entirely new system, under which the water of London was to be entirely supplied on the one side from reservoirs filled from gathering-grounds in the Bagshot sands, and on the Surrey side from the district known as Hind Head, to the south of Guilford. We may add that if this theory had been carried out the whole supply would have totally ceased in subsequent dry years.

In the same year, a bill having been introduced bearing upon the supply of the river Lea, the report of the Board of Health underwent a severe scrutiny before a committee of the House, and the theories of the water doctor-quacks completely pulled to pieces. About the deficiency and inferior quality of the existing supply there was no possible dispute, but, as usual in times of plague and pestilence, quacks arose and made themselves heard, and amongst them none were louder or more plausible than the arch-quack of the Board of Health—the lawyer who first drew his brief, and then collected evidence to fit his case. A scientific commission appointed by the Government, reported, in 1850, that the water supplied to the metropolis had (naturally) no unwholesome qualities; that there was no reason for believing that the mineral qualities of water were injurious to health. They recommended that the supply should be protected from town sewage, and they condemned the proposed plan of the Board of Health. In 1851, Her Majesty's Government introduced a bill to vest the future supply of the metropolis with water in commissioners, and it is, perhaps, to be regretted that the attempt was not so far successful that the companies had been reduced to not more than three. A committee of the House of Commons investigated this bill, and came to the conclusion that by proper arrangements the existing defects might be remedied, and a sufficient supply of water of good quality obtained from the valley of the Thames and the other sources employed by the existing companies. Thus the House of Commons was in possession of the most complete information before passing the act of 1852 which at present regulates the water companies, and which it is now proposed still further to amend.

The following are the chief provisions of the Metropolis Water Act of 1852. The companies were prohibited after August, 1855, from taking water at any part of the river Thames below Teddington Lock, or from any tributary stream or any part below the highest point at which the tide flowed. The reservoirs of all companies within a direct distance of five miles from St. Paul's were to be roofed over, unless the water was to be filtered after leaving the reservoir. All water was to be filtered, unless drawn direct from wells into a covered reservoir for distribution. The committee having traced the legislation to this point, proceeded to examine the results of the works executed in consequence of the act of 1852, and to ascertain how far it secured the metropolis a sufficient supply of wholesome water. Since 1852 the five companies drawing their supplies chiefly from the Thames have expended the following sums:

Chelsea Company	£525,756	Southw'k & Vauxhaul..	£661,179
West Middlesex	292,271	Lambeth	559,321
Grand Junction	391,449		
Total			£2,439,967

From these works the five companies obtained an average daily supply, in 1856, the first year that the act came into full operation, as follows:

Chelsea, gallons	5,582,090	Southwark & Vaux	10,531,122
West Middlesex	6,005,239	Lambeth	5,391,000
Grand Junction	5,478,361		
Total, gallons			32,037,276

The quantity of water drawn daily from the Thames has gradually increased since 1856, until in 1860 it amounted to 46,977,228 gallons. The estimated number of persons now supplied by these companies is 1,379,000. The committee estimate that if the population should double within the next sixty years the supply of water required at the present rate per head would not exceed 100 million gallons. The committee satisfied themselves that the "smallest quantity of water known to flow down the Thames at the source of supply in the driest time on record, exceeds 350 million gallons in a day; that the maximum flow in time of flood exceeds 25,000 million gallons; whilst the daily average flow in dry seasons may be estimated at 500 million gallons." The committee therefore report evidently from the evidence of Mr. Bailey Denton, "that if, at any future period, the increase of population should render it necessary to make provision for a greater supply of water than could be conveniently drawn from the Thames in dry seasons, it could be made by storing in reservoirs in the valley of the Thames a portion of the flood water, which now yields in a single day sufficient supply for a whole year."

With respect to the quality of the water, the committee report that a very decided improvement since 1851 is shown by the regular examination of the analytical chemists officially employed for that purpose. The diminution in the amount of organic matter amounts to one-half of the quantity found in 1851, and this is not an accidental or average result, but uniformly observed throughout the year: but the committee dwell on the necessity of securing water from impurity which chemical science may fail to detect, by excluding sewage and other known sources of contamination. By a bill passed in the present session, an authority has been created charged with the duty of preserving the Thames from pollution of sewage between London and Oxford. The committee recommend that representatives from the water companies drawing their supplies from the Thames, and one from the Metropolitan Board of Works, should be added to the Board charged with conservancy of the Thames, in order that the water supply of the metropolis may be actively protected by those mostly interested in the purity of the supply. The committee report decidedly against the comprehensive schemes of Mr. Hemans (they do not mention any names) and other engineers naturally anxious for a great work to do, considering that "both the quantity and quality of the water supplied from the Thames is so far satisfactory that there is no ground for disturbing the arrangements made under the act of 1852," and that to go to Wales or Cumberland or the sources of the Severn, "would only entail a waste of capital and an unnecessary charge upon the owners and occupiers of property in the metropolis."

Sunlight in the Mines.

Amongst those whose acquaintance with colliery operations, and with the interior of collieries, is limited to what they have read in books, it is customary to regard an explosion as the most lamentable casualty to which the collier is exposed; yet an examination of the statistics annually supplied by the Government Inspectors of Coal Mines (and the abstracts published in the *Mining Journal* may be taken as representing the fair average), will show that the deaths resulting from explosions are but few in comparison with those from other classes of accidents, although the circumstance of explosions usually killing the miners wholesale gives them a sensational character, whilst no thought is taken of the far more frequent accidents by which the men are killed singly. Taking the average of the last two years, it appears that for every death resulting from explosions three deaths occurred through falls of roof, and that the deaths resulting from accidents in shafts were considerably more numerous than those caused by explosions; hence it follows that quite as much attention should be paid to 'falls' and 'shaft accidents' as to explosions, if it be desired to reduce the number of colliery fatalities to the minimum.

That a large number of the deaths from falls of roof as well as some of those classified as shaft accidents, occur through insufficient knowledge of the faults and irregularities of the strata is beyond question, and it has occurred to Mr. Larkin, whose beautiful magnesium lamp attracted so much attention at the last meeting of the British Association, that if a reliable and portable lamp could be placed in the hands of the chief underground manager of a mine, which should enable him to make himself thoroughly acquainted with the most minute details of the structure of the roof, and of any changes which may from time to time take place, an important end would be gained; he has, therefore, constructed a hand-lamp, not much heavier than an ordinary Davy, capable of producing the magnesium light with certainty and regularity, and containing no clockwork or other mechanical arrangements to get out of order.

The new lamp is very compact, and throws out a most brilliant light. A spirit-flame is used to ignite the magnesium, and as the flow of the powder can be instantly stopped and recommenced, there is every facility for securing economy by using the light only during the precise period when it is required. The magnesium is used in the shape of granulated crude metal, either alone, or diluted by being mixed with sand in varying proportions, according to the volume of light required. It is necessary that the powder should be kept beyond the reach of the atmosphere, to prevent deterioration, but this presents no difficulty to the consumer, as it is supplied in suitable cases. The light is well worthy the attention of surveyors, inspectors and managers of all kinds of mines, and is not excessively costly for the special purposes indicated.

Mr. Larkin's lamp might also prove of great value to railway engineers to enable them to carry "daylight" into the tunnels, and so examine, more thoroughly than would otherwise be possible, the condition of the roofs, etc. Mr. How, of Foster-lane, exhibited one of these new magnesium lamps, burning the undiluted metal, at the recent *conversazoine* at Guy's Hospital, and excited considerable interest by the extraordinary light thus simply produced, which made the other lights in the brilliantly-illuminated saloon look singularly dim and powerless.—*Min. Jour.*

Correspondence.

Clay Retorts.

TO THE EDITOR OF THE AMERICAN GAS-LIGHT JOURNAL:

DEAR SIR: I have long intended to avail myself of your invitation to gas men to make your valuable paper the medium for the intelligent discussion of questions connected with the gas business; but the fact that I am no scholar has detered me from taking this step.

The articles on the management of gasworks in the earlier numbers of your Journal contained much valuable information; but since the publication of these articles, the introduction of clay retorts has become more general, and plain, practical information as to the proper working of them, and the results obtained, is much wanted. We have known the Superintendents of small works who have tried clay retorts, and most all have given them up, and the reasons they give for doing this are, that they leak and there is so much carbon that collects inside of them, that they think that they cannot be used without an Exhauster; then, when we try to clean them, they leak so terribly that we cannot afford to lose so much gas. We know that this has been the experience of many in using clay retorts. The difference in the first cost between iron and clay retorts is now known to most all Superintendents of gasworks. We have been using clay retorts for the last ten years, and would simply state what our experience has been.

When we took charge of these works (about two years ago), we found in use two benches of clay, and two of iron, the clays condemned, and new iron ones in the yard to replace them; we repaired a little, and worked through the winter. In the Spring we commenced the erection of five ovens, for benches of fives, two of which we completed, and which served us last winter, our consumption during the months of December and January being from 58 to 60,000 feet per 24 hours. We made this with ease, and seldom made any gas during the 24 hours of the Sabbath, and we kept our retorts almost clear of carbon, never allowing it to collect more than one-half an inch thick before removing it. *We use no Exhauster.* The pressure on the retorts during our largest consumption was 3 5-10th inches; during the smallest, 3 5-10th inches. Our retorts are still in excellent order, in fact, we know no difference in the appearence of the inside of them from that when they were first set. The only repairs needed has been in the furnaces, which have been relined. We expect to run through this winter with them if our consumption does not increase beyond our present calculations. Our average yield for the six months ending March 11th 1867, was 5.15 per lb. of coal; loss by leakage, &c, about 8 per cent. Our old coal lasted till July 1st; since we commenced using the new our average yield has been 5.40 per lb.; by Photometer our gas shows an illuminating power of from 13.80 to 15 candles. We have never seen so small an amount of carbon collect in retorts doing the same work, as has collected in these, nor have we seen it so easily removed. The quantity of tar made is also very small and very heavy. We are satisfied, sir, that the small amount of carbon and tar made during the distillation of the coal is owing to the uniform high temperature at which our retorts are worked, and that this accounts for the *large yield* and *good quality* of the gas. We are aware of the difference of opinion existing among Gas Engineers as to the temperature at which the largest and best quality of gas can be made; we think this part of gas-making is not so well understood among Superintendents of gasworks as it ought to be, and we shall be glad to see it discussed by some one qualified to do it.

We are away out of the world here, sir, and are always glad to hear of improvements in gasworks. In your issue of August 16th you mention some being made in the Brooklyn, N. Y., works, and among others the improved condensers they are putting up. If you will take a run out our way this fall we will show you two companies works, with condensers of this description in use. We believe they were originated by J. F. and Jessie W. Starr, of Camden, N. J., though we do not so know that even they have built any of them. Very truly yours,

OUT WEST.

Russia Sheet Iron.

[From the Mining and Scientific Press.]

Few persons are aware of the enormous expense and difficulty attendant upon the importation of Russia sheet iron into the United States, or of the quantity of this material which enters into the various forms of its consumption. The imitations of this iron, which have been from time to time attempted in this country, have hitherto been quite unsuccessful. Although those imitations are often sold for the genuine Russia iron, so near to the genuine are they in external appearance, yet the art of making it stand actual wear, on exposure, is still—unless quite recently discovered—a hidden art to American mechanics.

The indestructibility of Russia iron is most remarkable. Stoves made from it will, with ordinary care, last as long or longer than cast iron stoves, and retain their luster until they are destroyed by an almost imperceptible wearing away, or reduction in thickness of the material.

Some fourteen or fifteen years ago, there was an effort made to get an act of Congress for the issue of a patent for the manufacture of this iron, without spreading the secret of the process on the records of the Patent Office; but, so far as we have learned, nothing ever came of it. Of late it is said that the Parkins Sheet Iron Company, of Providence, have been making Russia iron of a quality equal to the imported article. It is also said that there is a company in Cleveland Ohio, and another in Portsmouth, in the same State, making about the same quality of iron. The latter is said to be in possession of the true secret of the manufacture, as conducted in Russia, and the only parties possessing it. The secret, it is said, was sent to this country clandestinely, through the agency of a citizen of Youngstown, Ohio, who had a relative in the works in Russia. It is generally understood that Russia has heretofore kept a close monopoly on this superior iron, and that she has thus been able to extort from us, as well as from other nations, a heavy revenue therefrom.

On the contrary, it is said by at least one party, that there is no secret whatever in the Russian process, and that travelers have free access to the works, and are allowed to witness every part of the operation; and that any peculiarity or superiority in the iron lies in the quality of the ore from which it is made. William Atkinson, in his "Oriental and Western Siberia," says:

"Verne Issetzkor Zavod, about three versts from Ekaterinburg, belong to the Yakovliff family. These iron works have long been celebrated for the quality of sheet iron, which stands unrivalled. The sheet iron made in this Zavod, and some other works belonging to it, surpass all other productions of the kind, either in the Oural or elsewhere. It is rolled for various purposes—for covering the roofs of houses, for sheet iron stoves, and for a great variety of utensils. The metal is of such excellent quality that I have seen it rolled as thin as post paper, without crack or blemish, and with a jet black polish. An enormous quantity of the various sorts of this manufacture is sent to America. In the South Oural is Zavod of Kaslinskon; these iron works are famed throughout the Oural for the superior quality of castings they produce. I was astonished by the sharpness and beauty of the different articles manufactured, consisting of tables perforated by tracery and foliage, most delicately executed; chairs of a similar pattern, small boxes, baskets and dishes for cards, in beautiful open work; animals, paper weights, etc etc., cast equal to anything produced in Berlin. The metal used possesses much fluidity."

[There is a process for making imitation Russia sheet iron, invented and patented in this country by a Mr. Pomeroy, and now owned by Mr. John Gardiner of this city. We have seen samples of this iron which had been in use along side of real Russia sheet iron, for seven years, and the American iron was in much better condition than the foreign manufacture. The process of manufacture is simple and cheap, and in our judgment efficient. We understand Mr. Gardiner is negotiating to have works established to manufacture this American sheet iron on a large scale.—EDS. GAS-LIGHT JOURNAL.]

—At the Paris Exposition is a machine by means of which a rabbit skin may be converted into a hat in 50 minutes! During the process the hat undergoes six operations. The hats are lined and trimmed by a sewing machine

Stations on the Union Pacific Railroad.

The *Platte Valley Journal* say on that portion (377 miles) of the Union Pacific Railroad now open to freight and passenger traffic, 25 stations have been established, giving an average of fifteen miles between each station. A brief schedule of these stations will afford perhaps a better idea of the primitive features of this great pathway than any attempted sustained description;

Summit Siding—3 2-3 miles from Omaha—a switch, no houses.

Papillion, 12½ miles—A wood and wagon station, one house, with Irish railroad laborer's family; country rolling and fertile

Elkhorn, 28 miles—The eastern gateway to the great Platte Valley, stretching over 500 miles from the Missouri river to the Rocky Mountains, two or three scattered settlers in sight; country rich.

Diamond's, 33 miles—Wood and water station only; fine prairie region.

Fremont, 46 miles—A town of sixty or eighty houses; good farming region, well settled for several miles around.

North Bend, 61 miles—A dozen frame structures; two rival eating houses—price of meals, $1. The Platte river here makes a sweeping bend to the north, and the railroad runs to within a few yards of it. Track usually several miles north of the stream.

Shell Creek, 75 miles—Two or three houses; wood and water station.

Columbus, 91 miles—Town of 400 inhabitants. Like the last stations, situated in a good farming region; millions of mosquitoes; originally settled by Ohioans, and named after the Buckeye State Capital.

Silver Creek, 109 miles—A house or two. Fertile country.

Lone Tree, 131 miles—A lone house, but no lone tree in sight; wood and water station.

Grand Island, 153 miles—Half a dozen houses, good eating station; meals, one dollar.

Wood River, 181 miles—A wood and water station only; fine prairie region.

Kearney, 190 miles—The railroad feeder of Fort Kearney, a few miles distant from the opposite side of the river: eight or nine houses, one or two stores.

Elm Creek, 211 miles—One house, country poor.

Willow Island, 250 miles—Three or four houses; soil is constantly growing worse.

North Platte, 290 miles—This town lies between North and South Plattes, at their confluence, and for several months was the busy terminus of the road. A fortnight ago, Julesburg became the terminus, and North Platte is decaying. It contains a railroad round house, a large frame hotel, where meals are provided at $1.25 each, thirty or forty nondescript wooden buildings, one story, devoted to trade, a suburban belt of tents. A semi-weekly paper, the *Fronties Index*, was published here recently, but like everything else movable, is off for Julesburg! The king is dead; long live the king! Country around North Platte very poor.

O'Fallon's 305 miles—From this point west the country is almost a desert. One old ranch at O'Fallon's.

Alkali, 305 miles—Named from the predominance of the soil. No houses at Alkali. Lot of sand and some lovely cacti in full bloom.

Ogallala, 341 miles—Named from the Indian tribe. The only distinguishing feature of Ogallala is a railroad siding and a pile of cottonwood ingots.

Big Spring, 360 miles—Another solitary ranch.

Julesburg, 377 miles—The business end of the road. The Denver coaches connect here. Busy place, and will be busy until the railroad takes another westward leap; then away goes the *Frontier Index*.

A CALIFORNIA INVENTION.—Mr. J. H. White, of San Francisco, Cal., has recently invented a furnace for the burning of petroleum in quantities sufficient to generate steam enough to propel the largest steamer afloat at a rate of speed fully equal to that obtained at present by burning coal. We take the following from the *Morning Daiiy Call:* The furnace is of simple construction, and can be applied in a few hours to the furnaces at present used in the ocean-going steamers. By this furnace eight gallons of crude oil will last as long and generate as much heat as a ton of coal, and we have no doubt that as soon as its merits become known it will be adopted in many of the mills in the mining regions where fuel is scarce, and upon steamers making long voyages, where it is an object to carry as much fuel in as small a space as possible. Mr. White informs us that a good burning fluid from the San Buenaveneura oil wells can be furnished in San Francisco at twenty-five cents per gallon, which will make the cost at the rate of two dollars per ton for coal. This will be found to be an immense saving in the cost of fuel, and will be a great incentive to capitalists to examine Mr. White's invention with a favorable eye.

☞ See page 95 for more reading matter.

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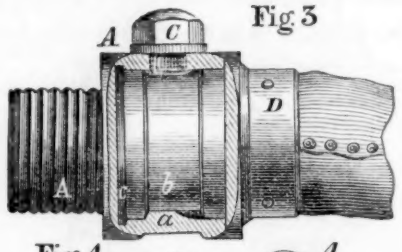
Fig 3



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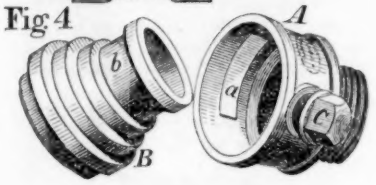

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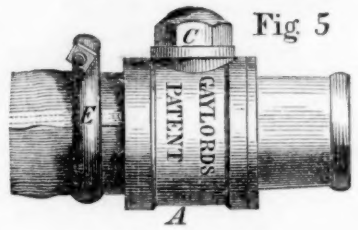

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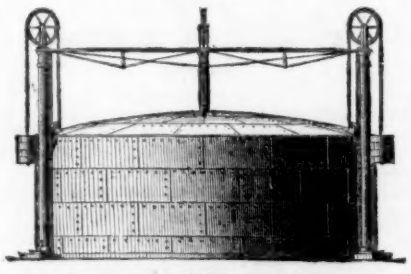

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NOTICE
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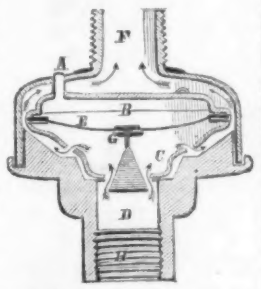

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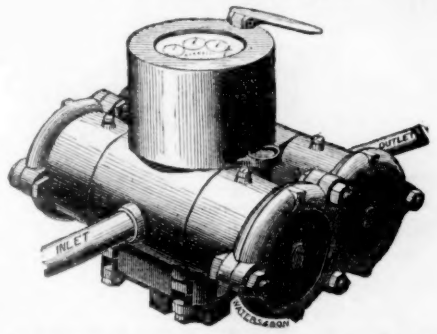

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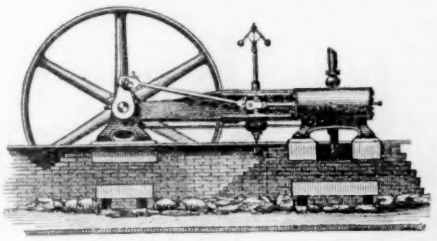

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BRYANT, CALLENDER & CO.,
EDITORS AND PROPRIETORS.

MONDAY, SEPTEMBER 16, 1867.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

SUBSCRIBERS would confer a favor upon us by remitting CHECKS or POST OFFICE MONEY ORDERS, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 119 and 121 Nassau street, New York, are agents for this Journal. Newsdealers will please send orders to them.

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Answers To Correspondents.

L. D. of Pa.—Metals when melted in contact become mixed and form alloys; nearly all metals are capable of mixing in this manner. Several of the metals when brought in contact with mercury will mix at ordinary temperatures, forming amalgam. The mercury being volatile, will be driven off at high heat, while the other metal is left behind. It is this property of mercury which is the basis of the method of separating gold from its ores by amalgamation, and afterwards freeing it from the mercury by heat, which volatilizes it when it passes off and is condensed for future use. Zinc, also, being more volatile than copper, may be partially driven off and separated from brass by a high heat.

N. A. B. of Ill.—When the carbon is all burned out of cast-iron in the Bessemer process, and the metal is brought to the state of pure iron in a molten condition, melted cast-iron is added to it to give it the requisite amount of carbon to produce steel.

S. P. of Ky.—*Silliman's Journal* has a treatise upon electricity which will give you the information sought. "Miller's Chemistry," which can be found at D. Van Nostrand, Publisher, 192 Broadway, also has an excellent treatise on this subject.

L. P. of N. Y.—Light may be polarized by refraction and by passing through certain crystals. The polarization will take place when light is reflected from a surface of glass at an angle of 56° 25′ reckoned from the perpendicular. The crystal called Tourmaline has the property of polarizing light more than any other article.

N. D. of Ill.—Pure olefiant gas may be made by heating six parts of alcohol with one part of sulphuric acid in a retort. It will require to be passed through a solution of caustic potash to free it from any acidulous properties.

—A novel speculation of the Accidental Insurance character has been started in Buenos Ayres. A joint-stock hospital has been opened to which subscribers who pay $1.20 in silver monthly are to be admitted free, and attended with the best medical skill, in case of sickness or accident.

AIR-GAS OR HYDRO-CARBONIZED AIR.

Illuminating coal gas is a mixture of light and mostly non-illuminating gases, loaded to saturation with hydrocarbon vapors. The common mixture of non-illuminating gases which forms the atmosphere, in like manner loaded with hydrocarbon vapors, becomes an illuminating "gas," or may be called so in the same sense and with the same propriety as coal gas. The only difference in effect is that the hydro-carbonized air is heavier than pure air, and cannot carry a load sufficient for illuminating purposes, below certain temperatures, or beyond a certain length of time after it is at rest. It must be used as fast as made, and cannot be cooled, and allowed to stand, or stagnate in its motion, without losing most of its illuminating contents by condensation. These conditions present no serious inconvenience in making and burning hydro-carbonized air on a small scale, or on the same premises. Hence the air-gas machines are intended for domestic and other limited establishments, and cannot be applied to lighting towns. The American Air-Light Company, in their experiment at Hunter's Point, of which so much has been said in the public prints, have indeed shown that with the aid of a gentle heat, air may be saturated with very cheap hydrocarbons, and that by afterwards heating the mixture to the decomposition (we think) of the hydrocarbons, it becomes so far fixed as to be transmissible throughout a city in mains, in the same manner as coal gas. This furnishes a cheap desideratum for small towns, where the heavy cost of coal gas apparatus, and the difficult process of manufacture, place that resort out of the question.

The domestic air-gas machines in the market make quite a variety on paper, but differ very little in principles of construction, athough of various grades of merit in the mechanical devices in which those principles are embodied. The main principle common to them all, is the forcing of air through light petroleum, at an ordinary temperature, taking up therefrom sufficient vapor to form an illuminating mixture. The great difficulty and defect common to them all, as at present constructed, is the rapid cooling of the oil by evaporation, to a temperature at which (unless extremely light) it can evaporate no longer: a difficulty which, of course, is not felt in warm weather, when the atmosphere supplies heat in abundance. Many efforts have been made to restore the evaporating temperature in cold weather, but the difficulty has been to keep the warmth steady, neither deficient nor excessive, without constant attention. The carburettor or carburator (inappropriate names both) has been immersed in hot water by one, and another has carried the oil out and back through a pipe passing in a coil around the chimney of an argand burner, while others have applied steam or hot water coils without or within the oil; but all these modes require the same attention. The applied warmth must be adjusted so as exactly to overcome the refrigeration attendant upon the supply of the required number of burners; for if in the least degree too little, the temperature will steadily fall until the lights go out from deficiency of vapor; while if in the least too much, the temperature will increase until the lights smoke from excess of vapor; and finally the apparatus may be heated to a dangerous condition. If part of the lights are thrown off, unless watchful attendance is given to the heating, the same result will ensue. The only machine at present in existence which is in any measure self-regulating in this respect, is the "Safety Gas Machine" of Boston, invented and for some time manufactured by Hiram S. Maxim. This however, despite its title, is under the ban of Insurance Companies, because its active principle (gravity) requiring it to be placed at a sufficient elevation above all the lights derived from it, usually involves locating it within the building. We honestly believe that no single petroleum lamp—not to say half a dozen—can be as safe as a well constructed gas machine, holding a small charge of oil, even within the house. But the lamps are invincible in numbers; to refuse to insure them, would be to give up the business of insurance; while the machines, being out, can be kept out.

The "Safety" machine, as the simplest and cheapest form of gas apparatus, is a proper beginning of the subject of structure. The hydro-carbonizer, as we will take the trouble to call it, is a close vessel filled with capillary substances, such as sponge, &c., which continue saturated with oil drawn up from the charge in the bottom, The gas pipe passes out above the level of the oil, and when gas is wanted a spring valve in the top is held open by drawing and fastening a wire, to admit air. The vapor, being heavier than air, descends the pipe, air is drawn in and saturated with vapor, and continues to descend by its own increased gravity; and by this simple arrangement, without motive power or machinery, a very convenient gas is enjoyed—by those who do not care for insurance. The lost temperature of the oil is restored from a burner, through a tube which conveys its heat up to the vessel; and the supply of gas to this burner is regulated by the gravity of the gas in the descent pipe, which is allowed to enter a small vessel having an india-rubber top, and sustaining this top by its density or pressure, keeps closed a valve suspended therefrom, and thus prevents any supply of gas to the heating burner. When, on the contrary, the gas begins to thin, through loss of the evaporating temperature, the india-rubber diaphragm sags and lets the suspended valve open and supply gas to the heating burner in the proportion required; a small independent jet having meanwhile been kept burning and in such a position as to relight the heating burner, whenever gas is supplied it.

For the rest, there are two general modes in use for obtaining the requisite pressure and passage of air through the oil: the meter-wheel pump, and the diaphragm or bellows pump. Of the former class, the Solar Gas Machine of O. P. Drake & Co., Boston and New York, is the best instance, and of the latter, the American Air-Light Company's Machine, of New York; to which may be added the American Portable Gas Company's apparatus, New York. Mr. Drake is one of the pioneers of real progress in this line of invention. His machine is the simplest and least liable to derangement or accident of all those that require motive power other than gravity—as all must that are located to save insurance, say 50 feet from the property insured. It consists of a wet meter wheel impelled by a weight, directly, without gearing, and constituting all the machinery of the apparatus. The air is driven by this wheel into a flat cast iron oil tank, throughout which it is circulated by a labyrinth of partitions, passing all the way between and through closely suspended cloths which dip in the oil and keep themselves charged with it by capillary attraction. A guage cock is set so as to turn the air through all or different portions of the internal labyrinth, at the pleasure of the manager, in order to draw more or less upon the oil, according to its temperature and density, and to maintain an illuminating mixture at all times. The separation of the simple air-pumping mechanism from the hydro-carbonizer, allowing any part to be reached or taken out by itself without difficulty; the absence of all machinery in the hydro-carbonizer, and the massive strength, compactness and tightness of the latter, are considerations which will weigh with judicious purchasers.

The American Air-Light Company's apparatus' like that of Drake, is very compact, strong, well designed and thoroughly built. It is perhaps better adapted for heavy work than any other we could name, having dry pumps (five in number) acting constantly in alternation, to sustain a steady air current of any required pressure. All these machines we have named naturally increase their speed and force as the consumption and demand of gas increases, and diminish action as it diminishes. The hydro-carbonizer in this machine forms a part of the same horizontal cylinder in which the blowers are placed, being separated from them by a vertical diaphragm. The oil is raised into the top of the cylinder by a bucket wheel revolving on the same shaft that impels the pumps, and then emptied into perforated pans, from which it streams in a fine shower, prevading the air space. The same handy guage cock used in Drake's machine, by single movements, lets on or shuts off from the pipes the whole flow either of gas or of pure air at pleasure, or mixes them in any desired proportions, with mathematical precision. The pressure is regulated by small weights or the action of a screw and spiral spring, upon a valve.

The American Portable Gas Company's machine combines with good points of its own, one from each of the above, though with less perfect and expensive mechanism. That is, as a dry pump machine it is made cheaper than the latter, and as a separate stationary hydro-carbonizer than the former. It has two alternating air pumps or bellows, inflating an elastic air-receiver which relieves any change of pressure from suddenness or jerk. Its hydro-carbonizer is a separate drum, filled with capillaries, and without machinery. It has also a bulb in the gas pipe, stuffed with sponge, which serves to retard and equalize the current excited by the discharge from the burners, and to arrest any possible (*if* possible) return of combustion through the pipes, and to arrest also any possible ascent of oil into the pipes in consequence of a vacuum formed by the condensation during repose.

All existing air-gas machines are liable to give trouble in cold weather from the refrigeration of the oil by evaporation, unless they are kept warm by some means, or at least supplied with extremely light and volatile oil. We look to see this trouble generally remedied by a self-adjusting heater on the principle already described, which is equally applicable to all good machines. The American Air-Light Company are manufacturing a new machine with automatic heater and other improvements which we shall take an early opportunity to describe.

NEW GAS WORKS IN CLEVELAND.

We learn new gas works are being built in opposition to the old company, for supplying West Cleveland. There are 7 benches of 5 retorts, though the works are so planned that they can be increased to 42 benches, when necessary. The Purifying House will have 3 boxes 12 x 14 feet, and room for the fourth when it is required. One Gas Holder 80 feet diameter by 20 feet deep. About six miles of mains, largest being 10 inches, and the distributing main and the smallest 3 inches.

The company is called the "Peoples Gas-Light Company," and has a capital stock of $150,000. Robert Cartwright, Esq., is the engineer who is erecting the works, and apparently in a manner which shows a desire to keep up with the progressive spirit of the age. The Gas Holder was built by George W. Kraft, Esq., of Philadelphia. The Retorts are clay, 9 feet long, made by J. K. Brick & Co. of Brooklyn. The bench castings by Messrs. Taylor & Sons, of Brooklyn. Mr. Cartwright has introduced Stanley's Hydraulic Main, and also at Meadville, Pa., where he lately erected new works, and says he "cannot speak too highly of it."

The gas interests of the West are becoming rapidly developed during the past two years. Every few days we hear of some new company starting into existence, not only the cities are having their rival gas companies to supply increased demand, but, in some cases, gas is being introduced in towns so obscure heretofore, as to hardly be known; but which have suddenly sprung up in business importance and increased in population and wealth, till they begin to ask and insist upon having the luxuries enjoyed by their neighbors in the adjoining cities.

AMERICAN INSTITUTE.

The ninety-seventh annual exhibition of this Institute was opened on Thursday evening, the 12th inst., with an address by the President, Horace Greeley. The year of the great Paris Exposition is one in which a great stimulus could not fail to be felt in all branches of arts and invention, and in all efforts to bring their products into notice by public display. Accordingly, the exhibition of the American Institute for this year was planned on a scale of unprecedented extent, and still, as much was rejected as accepted for the show. Improved arrangement and classification have also been suggested by the skillful management of the Paris Exposition. At the present writing the Exhibition has not been reduced to a degree of order that admits of any detailed, or even general, notice; but the following schedule of departments shows the plan:

First—Of Fine arts and education, including specimens of paintings on canvas, &c., engraving, photographs, sculpture, musical instruments, specimens of printing and bookbinding, and philosophical instruments.

Second—Of the dwelling—Kitchen ware, carpets, furniture, ornaments and building accessories.

Third—Of Dress and Handicraft—Apparel for ladies and gentlemen, cloths, hand implements used by ladies, specimens of dentistry, ornaments for the person, trunks, etc.

Fourth—Of chemistry and Mineralogy—Soaps, acids, leather, india-rubber and guttapercha preparations, paints, samples of baking and pastry cooking, specimens of natural stones.

Fifth—Of engines and machinery, stationary engines driven by steam, pumping machinery, machinery for working metals and wood, for preparing fibres and tissues, tools used in the various manufactures, and machinery used for varying speed and power.

Sixth—Of intercommunication—Locomotive engines, carriages, models of vessels for navigating the ocean, electric telegraphs, implements and materials used in printing, machinery for expediting trade, and army apparatus for the camp and movements.

Seventh—Of Agriculture and Horticulture—Specimens of plants and flowers, fruits, roots ploughs, diggers, churns, cheese presses, and specimens of the products of the soil used in arts.

NEW FIRE EXTINGUISHER.

Almost all great calamities of the physical and social world are the result of small evils which are allowed to go on unchecked—sometimes from neglect alone, but often for the want of proper and efficient remedies at the commencement. The small accumulations of noxious elements through neglect, become of a magnitude sufficient to imperil a whole neighborhood, and a frightful epidemic is the result in the form of cholera or fevers to sweep off thousands of hapless victims before it can be arrested. The small hole of a water-rat in the embankment of a viaduct or levee, which a shovelfull of earth would have stopped in the beginning, soon becomes a widened breach, and we hear of the terrible devastation of a whole county by a "crevasse." The few discontented spirits of a community, which a policeman's baton could have dispersed, foment and agitate real or apparent social or political grievances unchecked, and the violence and lawlessness of an uncontrolable mob, an insurrection or a civil war is the consequence.

The spark of a candle which the moistoned finger's end could have extinguished, soon obtains a greater headway which an immediate hydrant might have quenched, but wait a little longer, while the bells ring and the alarm is being sounded—the engines manned and hose properly disposed to play, we find alas! too late, that the little spark has "become master of the situation," as the swelling, roaring, devouring element envelopes in its seething folds and soon reduces to ashes what was, perchance, a splendid palatial structure, the abode of wealth and luxury, or perhaps half a city is the sacrifice offered up to the demon of destruction.

All this need not be hereafter. A little can the size of a large tea-caddy, always surcharged with a chemical compound, which, at the first alarm, can be used by the first person, man, woman or boy, who sees the danger. A cock is turned, and the quick, strong current of chemical fluid, self-impelled, springs upon its flame-crested antagonist, and down it goes, as suddenly and effectually as though a cataract had been let loose upon it. This little apparatus is called "Levy's Fire Annihilator," which, in truth, it is. No dwelling or inflammable structure, especially when inhabited, should be without this excellent invention. Its general introduction and use will leave little to be done by our fire companies; well may they say,

"Othello's occupation's gone."

Levy Bro's advertisement will be found in another column; their wareroom and office is at No. 8 Dey street, New York.

NEW GAS WORKS—ELIZABETH, N. J.

We were agreeably surprised lately, when making a call at the Elizabeth Gasworks, to discover the improvements going on there. Geo. W. Harris, the efficient and gentlemanly Superintendent, has been moving on in his quiet way, and the result is a fine brick structure for a Purifying House, 66 by 44 feet, and a wing for a meter room, 21 by 19 feet. The main building is divided into a purifying room 42 x 46 feet, and a condenser, washer and scrubber room 42 x 18 feet. The basement is elevated and dry, with a ceiling 8 feet high; the principal rooms have a ceiling 15 feet high. The purifying boxes, four in number, are 12 x 14 feet, and 3 feet deep, with a dry centre seal, made to come flush with the floor, which, together with a complete system of by passages and valves to every part of the apparatus, makes a very convenient and complete arrangement. The purifying apparatus was made and put up by Messrs. Morris & Taskar, of Philadelphia.

In addition to this a new Gasometer is being constructed. Tank 87 feet 8 inches diameter, 22 feet 3 inches deep; holder 85 feet diameter and 22 feet deep. This work is being done by Geo. W. Krafts, of Philadelphia, and when it is done the holder will have sufficient capacity for many years to come. We understand a new Retort House will be erected next Spring to complete the plans, when the old works will be abandoned and pulled down. Taken all in all, the works so far as completed are creditable alike to the parties who designed them, and those who are carrying out the designs in so complete and substantial a manner. A new improvement in gas manufacture is in operation here, which Mr. Harris has introduced and used successfully for over two years, whereby a great saving is made in the cost of manufacture. The same process is now being introduced in several gasworks in different parts of the country. As it requires very little alteration of the ordinary coal gasworks, it is likely to be rapidly and extensively introduced into the various works of the country where dividends are now small, or where larger dividends are desired, and we believe one or the other condition is likely to occur almost everywhere.

ABOUT ADVERTISING.

An Eastern man who engaged in business in New York within a year or two, tells us that he was advised by a friend experienced in business here, to advertise in the Gas-Light Journal. "I told him," continued our informant, "that I had adver-

tised in a great many papers and spent thousands of dollars, without ever having realized any appreciable benefit, and had about concluded to advertise no more. However, he still advised it so strongly, that I thought I would try for once, and you can imagine my disappointment at receiving within a short time not less than six orders in consequence of my little investment in your JOURNAL."

This is about five times too good. We like to have our advertisers encouraged by some tangible proof of benefit, but it is a mistake to expect it in a direct answer to general business advertisements. The advantage is exactly like that of a "sign." Nobody tells you that your *sign* induced him to trade with you; but most customers either would never hear of you, or would never be reminded of you, or would never find you, without the aid of a sign. The business that is not advertised is to the commercial world at large, what the business without a sign is to the throng in its own street—"out of sight, out of mind."

GAS IN NEW YORK—CORRECTION:

A leading gas official of the city writes us:—"You have under-estimated the quantity of gas produced in New York and Brooklyn. The Manhattan Company produced 1,195,350,000 feet of gas last year, and will produce 1,250,000,000 this year. The New York Gas Light Company will produce about half as much; the Metropolitan about one-fifth; the Brooklyn about one-fourth." The aggregate, with a very small allowance for the minor suburban companies, would make at least 2,500 million cubic feet per annum.

NEW GAS COMPANY IN MEMPHIS, TENN.—We understand the Memphis Gayoso Gas Company have awarded the contract for building the Gas Works and laying the pipes throughout the several streets of the city to R. T. Coverdale, Esq., of Cincinnati, an engineer of large experience in his business, who has erected a large number of works in various parts of the West. The plans and specifications have all been prepared and the works are already being erected, and bids advertised for excavations.

Several miles of pipe with "Robbin's Joint" has been ordered of Messrs. S. G. Gaylord & Co., of Cincinnati, and sent on by Mr. Coverdale, and the men to lay it. John Donovan, Esq. is President of the new Company. It is intended to have the works completed and in operation, and ready to deliver gas, by Christmas. We understand the books of the Company are still open for subscription.

☞ For new advertisements see page 86.

Professor HENRY WURTZ,

Formerly Chemical Examiner in the U. S. Patent Office, may be employed professionally as a SCIENTIFIC EXPERT. Geological Examinations and Reports, Analyses and Assays etc. etc., Practical Advice and Investigations in the CHEMICAL ARTS and MANUFACTURES. Invention and Examination of new chemical methods and products. Address 26 Pine street, rooms 35 and 36. Always in at 1 P. M.

☞ WRITTEN COMMUNICATIONS PREFERRED.

IMPORTANT TO GOLD AND SILVER MINERS AND COMPANIES.

PROFESSOR WURTZ,

Who is the inventor and Patentee of the new and wonderful uses of

Sodium in Working Gold and Silver Ores and Jewelers' Sweepings,

Will furnish at the above address information relating thereto together with experimental packages of

SODIUM AMALGAM

TO PARTIES ENGAGED IN MILLING ORES ONLY.

All preparations and instructions elsewhere obtained are spurious and unreliable.

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Edw'd Van Orden & Co.,

Manufacturers of Fire and Water-proof

Plastic Slate Roofing Materials,

ROOFING TOOLS, &C.

Office 41 Liberty-st.

Edw'd Van Orden. Jas. E. Dunn. NEW YORK.

MILLS CONVENIENT FOR SHIPPING.

WILLIAM ELTING

Manufacturers Agents for the Sale of

PORTABLE AND

Stationary Steam Engines,

BOILERS AND MACHINERY,

No. 65 Liberty-St, NEW YORK.

☞ Leather and Rubber Belting supplied at usual rates. Circulars sent on application. 55-78

BIRD, PERKINS & JOB,

IMPORTERS OF

COAL FOR GAS, STEAM AND IRON

MANUFACTURES.

Agents for the sale of the **Westmoreland** Coal Company's celebrated

GAS COAL,

and the Consolidation Coal Company's "Ocean Mine"

CUMBERLAND COAL.

Particular attention given to the charter of vessels at the lowest freights.

39 INDIA WHARF, Boston. 104 WALL STREET, N. Y. 134

A. HITCHCOCK,

Inventor and Manufacturer of the

Cam Quartz Breaker and Pulverizer,

REVERSIBLE ROLLER MILL,

IDAHO MILLS & AMALGAMATORS,

Adapted to All Kinds of Power.

Unequalled for utilizing power—avoiding friction and wear,—rapidity of work, and facility of transportation and adjustment. Also, **Hitchcock's Adjustable Tubular Flues cleaning Boiler,** and other valuable Patents, for which license to manufacture will be granted on reasonable terms. Circulars furnished on application.

53-76 *Office No. 4 & 6 Pine Street, New York.*

GEO. H. BRONSON,

132 Malden Lane, New York,

Dealer in

Paraffine Machinery Oil,

From PURE CANNEL COAL, adapted to all classes of

Stationary Machinery, Locomotive Engines, Railroad Cars, Woolen Factories, Cotton Spindles, Sewing Machines, &c.

Paraffine Wax and Paraffine Wax Candles. Also the best brands of Burning Oils. All Oils guaranteed to answer the purpose for which they are recommended.

57 80

D. B. GRAY,

DEALER IN ALL KINDS OF

INDIA RUBBER GOODS

Vulcanized Machine Belting,

Conducting, Hydrant, and Engine Hose,

GUM STEAM PACKING,

Amidon's Improved Clothes Wringer,

And all kinds of Useful and Fancy Rubber and Vulcanite Goods,

No. 201 Broadway,

Middle of the Block between Fulton and Dey Streets, NEW YORK.

WILLIAM S. CARR & CO.,

Succesor to Sawyer & Co.,

SOLE MANUFACTURERS OF

Carr's Patent Water Closets,

URINAL VALVES, &c.

Also Manufacturers and Dealers in PLUMBING MATERIALS OF EVERY DESCRIPTION, Plumbers' Brass Works, Earthen Ware, Pumps, Iron Drain Pipes, Traps and Sinks, Copper Bath Tubs, Showers, &c., &c.

OFFICE AND MANUFACTORY

149, 151, 153, 155, 157 Centre Street, cor. Canal, **NEW YORK.**

Illustrated Catalogue and Price List sent on application. 152-176

JAMES HOY. JNO. P. KENNEDY. WM. E. HOY.

HOY, KENNEDY & CO.,

Engineers and Contractors

FOR THE ERECTION OF

GAS WORKS,

Extensions, and Improvements, are prepared to supply

GAS-LIGHT COMPANIES

With all the materials used by them. [77-t

No. 111 Liberty street, New York.

JOHN P. NESSLE. JAMES A. TAYLOR.

Nessle & Taylor,

MANUFACTURING ENAMELERS

OF

IRON AND OTHER METALS.

97 Water street, Brooklyn. 171tf

JOSEPH NASON & CO.,

No. 61 Beekman street, corner of Gold,

NEW YORK.

Manufacturers of WROUGHT IRON PIPES and Fittings for Steam, Gas and Water, Boiler Flues, Steam Boilers, Coils, Heaters, Evaporators, Pumps, Ventilating Machinery, and Apparatus for Warming Buildings by Steam and Hot Water.

OIL TUBING, CAST IRON DRIVING PIPE, Boring Tools, Oil Pumps, Sand Pumps, Stuffing Boxes, Tongs, Clamps, Swivels, Joints, &c. 131

THOMAS CASSIDY,

Iron Founder & Pattern Maker

Corner Hudson and Park Avenues,

BROOKLYN.

Iron Store Fronts put up at short notice.

Square and Round Columns, Truss Girders, Vault Beams, Window Lintels, Sills, &c.

A large assortment of Railing Castings constantly on hand, or made to order, at the shortest notice.

Lamp Posts—Brooklyn Pattern.

☞ A large stock of the usual sizes of Round Columns kept on hand.

J. H. TIEMANN.

ANALYTICAL CHEMIST,

Metallurgist & Mining Engineer.

☞ GOLD AND SILVER BOUGHT.

240 PEARL ST. Cor. BURLING SLIP, N. Y.

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CHAS. HOWDON SMITH,

BROKER IN MINING STOCKS

AND OTHER SECURITIES,

No. 5 1-2 PINE STREET,

ROOM NO. 5, NEW YORK.

T. CASSIDY & CO.,

(SUCCESSORS TO P. CASSIDY,)

Dealers in Old and New

IRON, COPPER, BRASS,

LEAD, SPELTER, &c.

Corner of Bridge and John Streets,

BROOKLYN.

☞ N. B.—The highest cash price paid for the above named articles.

T. CASSIDY. 57-80 J. PEARCE.

J. W. WHEELOCK,

DEALER IN

GASOLEINE.

SUITABLE FOR GAS MACHINES, ALSO FOR CARBURETTING OF GAS, &c.

70-94 **204 Pearl St., New York.**

MANHATTAN

Fire Brick & Enamelled Clay Retort Works,

MAURER & WEBER,

(Of the late firm of B. Kreischer & Co.)

PROPRIETORS.

Office & Works in 15th street, Avenue C,

MANUFACTURERS OF

Fire Brick and Tiles,

OF ALL SHAPES & SIZES,

Fire Mortar, Clay and Sand.

☞ Articles of every description made to order, at short notice. (135

HY. MAURER. ADAM WEBER.

NEW YORK

Fire Brick and Clay Retort Works

☞ *Established in 1845.* ☜

(Branch Works at Kreischerville, Staten Island.)

B. KREISHER,

Office 56 Goerck St, cor. Delancey, New York.

GAS RETORTS, TILES and FIRE-BRICK of all shapes and sizes. FIRE MORTAR, CLAY, and SAND.

Articles of every description made to order at the shortest notice.

B. KREISCHER.

JOSEPH K. BRICK, EDWARD D. WHITE.

J. K. BRICK & Co,

BROOKLYN CLAY RETORT, AND FIRE BRICK WORKS,

VANDYKE STREET, BROOKLYN, N. Y.

J. H. GAUTIER & CO.,

MANUFACTURERS OF

Gas Retorts, Tiles and Fire Bricks,

Black Lead Crucibles, and Carburet of Iron Stove Polish,

JERSEY CITY, N. J.

Refer to—Manhattan Gas Light Co., New York. [135

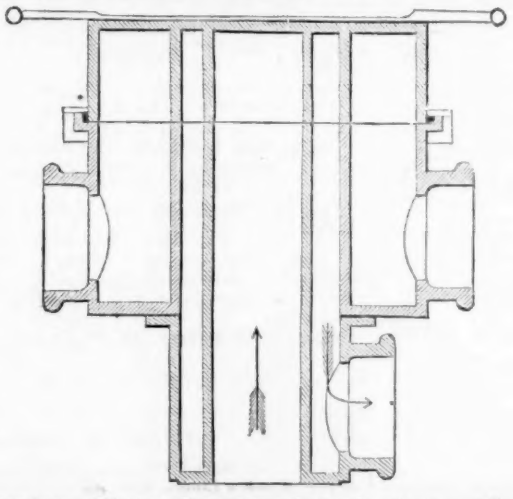
Philadelphia Fire Brick Works,

Corner of Vine and Twenty Third sts., Philadelphia,

JOHN NEWKUMET,

Manufacturer of all kinds of FIRE-BRICK, GAS-HOUSE TILES, to suit all the different plans in use. Clay Retorts and Dentists Muffles. Orders filled at short notice.

PATENT DRY CENTRE VALVE.



The **American Meter Company** invite the attention of Gas Engineers and Gas Light Companies to the PATENT DRY CENTRE VALVE, which is very superior to the HYDRAULIC CENTRE VALVE, and much more durable, besides being less expensive, and not likely to leak or get out of order. It has been successfully introduced at the following Gas Works, where reference may be had of its satisfactory performance:

Detroit, Mich.....	16 inch.	Louisville, Ky.....	6 inch.
Philadelphia, Pa....	12 "	Covington, Ky.....	6 "
Patterson, N. J.....	12 "	Zanesville, Ohio.....	6 "
Pittsburg, Pa.....	10 "	Indianapolis, Ind.....	6 "
Cleveland, Ohio.....	8 "	St. Joseph, Mo.....	4 "
Bloomington, Ill.....	8 "	Maysville, Ky.....	4 "
Meadville, Pa.....	6 "	Troy, Ohio.....	4 "

Having the Patterns complete for each size, from four inches to sixteen inche we are prepared to furnish them at short notice.

AMERICAN METER COMPANY,

512 West 22d Street, New York.

22d and Arch Street, Phil'a.

73-tf 23 West Street, Boston.

PRINCE'S METALLIC PAINT.

AN INDESTRUCTIBLE COATING FOR

IRON, TIN, and WOOD.

It consists of seventy-two parts Oxide of Iron, and twenty-eight parts Cement Lime Stone in the one hundred pounds.

It has much more body than red or white lead. It is warranted perfectly water and fire-proof and to withstand a greater heat on metals, without scaling, than any other paint in use.

It is a perfect cover for all kinds of iron, tin, or wood-work, out-houses, and canvas coverings. It prevents and arrests the corrosion of metals, and is not affected by the action of salt, gases, acids or ammonia.

It hardens under water, as has been fully demonstrated by its application to gas-holders, by many of the largest gas companies in the United States; which companies having thoroughly tested its properties as herein claimed, pronounce in its favor over any other paints in the market, even though said at double its price.

As a coating for patterns of iron or wood, when mixed with shellac, it is much superior to beeswax, oil, or shellac alone, as has been proven at the large founderies in the country.

For patching boilers and making joints, it is considered superior to red lead, or any other preparation.

For cleaning metals it takes the place of crocus, ouge, and emery, being better and cheaper.

This Paint requires no more oil than dry lead or zinc, and much less than the ordinary mineral paints. It is free from any waste, and possesses a spreading and covering power unequaled.

Terms, by the Barrel or Half Barrel, Five Cents per Pound.

A liberal discount made to parties purchasing by the ton.

A Barrel or Ton will be forwarded to any gas companies desirous of testing its qualities, for which there will be no charge if it does not give entire satisfaction as being the cheapest and most durable of all other Paints in the market.

Also, Prince's Imperial Black Paint, and Prince's Protoxide of Iron.

DANIEL SLOAN & CO., General Agents

115 LIBERTY STREET, NEW YORK.

Local Agent—CALVIN GAY, 29 Federal st., Boston.

WATER AND SEWERAGE PIPES,

KNIGHT-BAILEY PATENTS.

The Water Pipes are made of Wrought Iron, lined with Hydraulic Cement, with Socket Joints, and connections for service pipes already inserted. Entirely free from oxidation, they are absolutely indestructible. They can be laid and guaranteed for much less than Cast Iron Pipes.

The Sewerage Pipes are made of Hydraulic Cement. They stand the most severe tests of acids, increase with age, are perfect in interior finish, and cheaper than any other pipes made.

☞ We will contract for the water supply and drainage of cities and villages.

AMERICAN WATER AND GAS PIPE CO.,

N. W. corner of Green and Bay Streets, Jersey City.

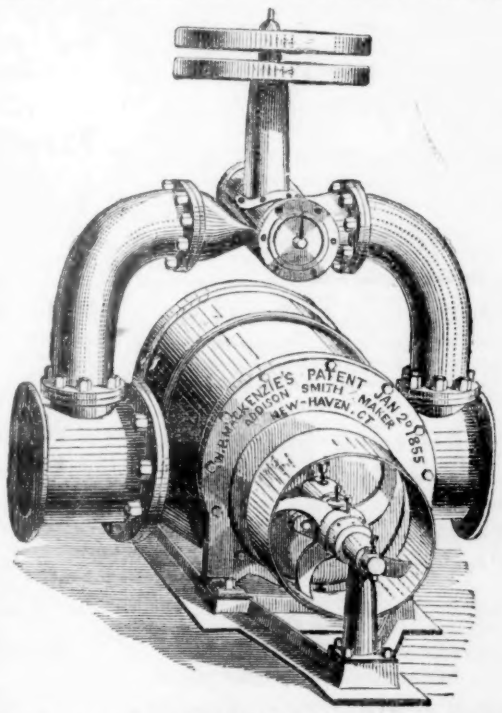
DIRECTORS:

J. R. HALLADAY, Pres. G. H. BAILEY, Eng'r. GARWOOD FERRIS, Treas.
WILLIAM KEENEY. JAMES CRAWFORD. STEPHEN MORGAN.

Smith & Sayre Manufacturing Company.

The Mackenzie Patent Gas Exhauster,

AND PATENT COMPENSATOR.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 ton to 20 ons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent. fuel. Address

B. KREISCHER., Prest.

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WASHINGTON MILL

AND

SILVER MINING COMPANY

OF ECHO DISTRICT, HUMBOLDT CO., NEVADA.

Capital Stock $300,000,

Issued for Mining Purposes.

60,000 Shares at Five Dollars each.

OFFICERS: President.—J. Clements Stocker. Vice President,— John J. Thomas. Secretary and Treasurer,—Henry Lee Reynolds. Superintendent,—William S. Sargent.

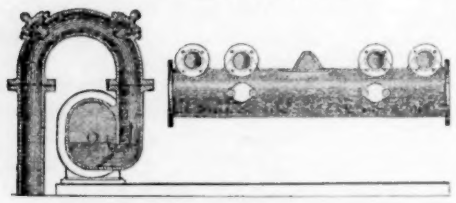
TRUSTEES: J. Clements Stocker, New York city. John J. Thomas, New York city. Lewis W. Ph lips, New York city. F. Page Davis, Unionville, Nevada. Henry Lee Reynolds, New York city.

Office of the Company, 30 Pine street, New York.

☞ The mine of this company rapidly approaching that point of development which will necessitate the erection of a Mill, the Trustees are authorized to dispose of 10,000 shares of the reserve capital stock.

STANLEY'S

HYDRAULIC GAS MAIN.



WILLIAM TAYLOR & SONS,

COLUMBIAN IRON WORKS,

Nos. 11, 13 & 15 Adams Street, Brooklyn, N. Y.

MANUFACTURERS OF ALL KINDS OF

Castings, Iron Buildings Store Fronts, Columns, Girders and Beams.

ALSO,

Gas Works Castings of all kinds.

Steam Engines, Mill Gearing, Hydraulic Presses for the manufacture of Linseed and Cotton Seed Oils, Sugar Mills, Single and Double Action Pumps, also Steam Pumps, Coal Oil Machinery, High and Low Pressure Boilers, Tanks, Kettles, Soap Curbs, &c.,

MADE AND REPAIRED AT THE SHORTEST NOTICE.

WM. TAYLOR. JAMES A. TAYLOR. EDWIN S. TAYLOR.

PLASTIC SLATE ROOFING

JOINT STOCK COMPANY.

OFFICE 157 [Room 19] BROADWAY,

New York.

W. C. POTTER, Vice Pres't.
J. M. ALLEN, Sec. and Treas. LICENSES GRANTED.

PLASTIC SLATE

FOR

ROOFING & OTHER PURPOSES.

The process of reconstructing Slate Stone from a disintegrated state was

PATENTED FEBRUARY 21st, 1865.

It is a combination of

Pulverized Slate & Viscous Matter,

(the latter possessing qualities of geological and chemical affinity for the former,) and is a development of one of the simple but unalterable tendencies of nature.

As a Roofing Material it Stands Unrivalled.

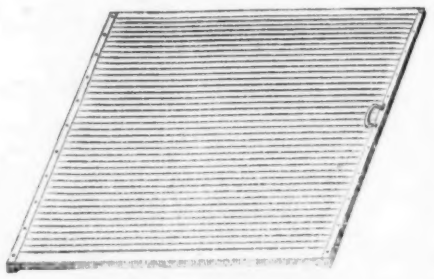
A mastic—it adapts itself to every shape and slope. Non-combustible, impervious, non-expansive, and undecaying.

Frost does not Crack nor Heat Dissolve it.

The only roofing material ever discovered that will resist the action of the elements as long as the structure it protects. Being susceptible of little, if any wear, from exposure, and

Perfectly Fire-Proof,

qualled as a coating for Railroad and Farm Buildings, Fences, Bridges, bottoms of Vessels, Vaults, etc.



JOHN L. CHEESMAN,

MANUFACTURER OF PATENT CONICALLY SLOTTED SOLID WOOD TRAYS.

Two hundred per cent. cheaper than Iron and will last twice as long.

☞ All persons are cautioned against purchasing of any other person. Orders received by mail, or otherwise. JOHN L. CHEESMAN,
147 and 149 Ave. C., New York City.

BAY STATE FIRE BRICK

—AND—

CLAY RETORT WORKS.

CHELSEA, MASS.

DAVIS & CHADDOCK,

MANUFACTURERS.

Office Nos. 125 and 127 Water-st., Boston.

Also agents for the sale of J.K. BRICK & Co's, Clay Retorts, Fire-Brick, Gas-House tile, etc. 66tf

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BROOKLYN TUBE WORKS.

B. T. BENTON,

MANUFACTURER OF

WROUGHT IRON AND GALVANIZED

TUBES,

For Steam, Water, or Gas.

MANUFACTORY AND OFFICE,

Co ner John and Adams Street, Brooklyn

ALSO

58 John Street New York. 171

Notice to Companies Operating in Lands, Mines, Railroads, etc.

AN ENGINEER AND GEOLOGIST WHO HAS had long experience in the Coal-fields, Collieries, Furnaces, and various descriptions of Mines, and in building Inclined Planes on prominent Railroads of the country, etc., is prepared for an immediate engagement. Can give suitable references. Address
ENGINEER AND SUPERINTENDENT,
Lock Box 40, Richmond, Va,

OREGON IRON FOUNDRY,

738, 740, 742 and 744,

Greenwich Street, New York.

CASTINGS FOR

GAS WORKS

OF ALL DESCRIPTIONS, INCLUDING

Purifiers, Exhausters, Compensators, Self-Acting Valves, Branches, Bends, &c.

FLOYD'S PATENT

Malleable Iron Retort Lid.

SABATTON'S PATENT

Furnace Door and Frame.

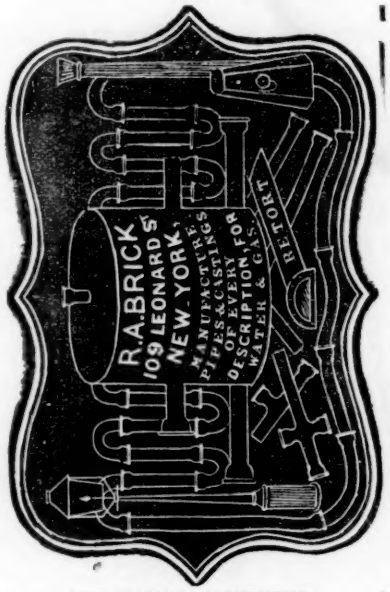
REFERS TO—J. A. Sabattan, Esq., Engineer Manhattan Gas Co—Col. A J. White, Metropolitan Gas Co.—C. C. Mowten, Engineer New-York Gas-light Co.—J. Mowten Saunders, Engineer Baltimore Gas Co.—John T. Harrison, Engineer Savannah Gas Co.

136] HERRING & FLOYD, Proprietors

SILAS C. HERRING. JAMES B. FLOYD

DRIVING PIPE,

BERGEN IRON WORKS,



OFFICE 109 LEONARD STREET, NEW YORK.

AND BANDS COMPLETE.

J. FIRMIN,

Gas Fitting and Plumbing,

Nos. 64 & 66 Maiden Lane, cor. William-st.

Residence, No. 1147 Broadway, near 26th-st.

HOUSES FITTED UP WITH PLUMBING AND GAS WORK IN THE MOST MODERN AND IMPROVED STYLE. SEWERS CONNECTED. BRASS AND LATHE WORK. JOBBING IN ALL ITS BRANCHES ATTENDED TO WITH PUNCTUALITY AND DISPATCH.

GAS BILLS REDUCED.

Gas Lights perfected upon New and Unerring Principles.

REFERENCES:

At A. T. STEWART'S the gas-lights were improved and the gas bills reduced one-third, amounting to several thousands of dollars per year.—A. O. WILLCOX, No. 40 Wall-st.

At the TRIBUNE ASSOCIATION gas bill reduced upwards of one hundred dollars per month, and better lights given.—SAMUEL SINCLAIR Publisher.

At H. B. CLAFLIN'S, late Claflin, Mellen & Co., gas bill reduced—amount not yet ascertained—but it will be at the same ratio, and light improved.—Mr. BANCROFT.

At WM. SCHIEFFELIN & Co.'s, corner William and Beekman-sts., good light obtained and maintained at all parts of the premises, without additional cost—a result despaired of even by the Gas Co. owing to the deficiency of supply. No deficiency by FIRMIN'S system.

Similar results guaranteed under similar circumstances, or NO CHARGE. 65-88

Worthington's Steam Pump,

Extensively used by

GAS-LIGHT COMPANIES,

For sale at greatly reduced prices. Also, a new and highly successful Pump, driven by water pressure, requiring no attention or repairs, and the most economical water motor yet constructed.

☞ Patent GATES for Water and Steam-stops.

HENRY R. WORTHINGTON,
61 61 Beekman-st, New York.

NATIONAL FOUNDRY

AND PIPE WORKS.

Office and Works—Carroll, Pike, Smallman and Wilkins Streets,

PITTSBURGH, PA.

WM. SMITH,

Manufacturer of all kinds of GAS and WATER PIPE, BRANCHES, CONNECTIONS, T's, ELBOWS, and ALL CASTINGS USED AT GAS AND WATER WORKS.

I offer special inducements to parties wishing to purchase, my Pipe is Smooth, regular in weights, and cast vertically.

N. B.—Pipe from 3-inch and upwards, cast in 12-ft. lengths.

☞ SEND FOR CIRCULAR AND PRICE LIST.

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FOR SALE

THE VALUABLE IMPROVEMENT FOR SAVING and otherwise improving the gas, invented by Dr. J. S. Wood, described in the "Gas-light Journal" October 2d, 1866, is now for sale by State or County rights.

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CHARLES H. REICHMANN,

Manufacturer and Jobber of

LAMPS,

Petroleum Stoves, &c.

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Porcelain Shades,

WICKS, &C.,

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ALL ORDERS promptly filled for his Patent Petroleum Stoves or Lamp Heaters, which are acknowledged to be superior to any other article of the kind now in use, as regards economy in consumption of oil, as well as simplicity of construction.

These Cooking Apparatus are used like any coal oil lamp, being provided with a sheet metal chimney, in consequence of which they burn without odor or smoke. They radiate no heat into the room, and are therefore very desirable in hot weather.

Also, Nursery and Night Lamps combined, a superior and cheap article for nursery or sick room; has a kettle, cup and pan, complete.

REED & COGSWELL,

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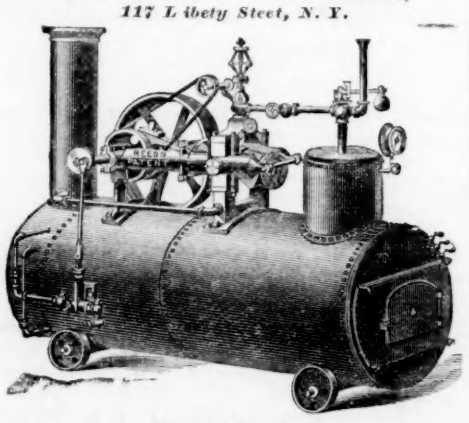

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Kerosene Cooking & Heating

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THESE COOKING STOVES WILL

☞ *Bake, Boil, Stew, Fry and Roast,*

With the greatest economy and facility, and without heating the room in which they are used. They are perfectly simple, operating like an ordinary Kerosene Lamp with a chimney, and are the only Kerosene Stoves that burn without smoke or odor.

"We have been perfectly astonished to see what a labor-saving, dirt saving and heat-saving institution is EDDY'S PATENT KEROSENE STOVE. Taking the cost of running it, and the result attained, it is the best patent in the market."—*Worcester Daily Spy.*

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Send for Illustrated Circular. (136

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FOR

Families and Manufacturer,

☞ *Something New and Invaluable for Family Use.*

We offer the public the simplest, strongest and best Knitting Machine in the world.

It occupies but little space—is portable and can be attached to a stand or table, weighs about 40 lbs.

It will knit a variety of Stitches—the breakage of needles is trifling—the cost of needles is insignificant and the most delicate material can be knit pure and spotless, as the needles are not oiled.

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137] 537 Broadway, N. Y.

WEED'S

HIGHEST PREMIUM

Shuttle Sewing Machine

Has only to be seen and operated to be Appreciated.

Call and see for yourself before purchasing. Please bring samples of various kinds of thread, (such as is usually found at stores,) and various kinds of fabric, which you know the former most popular Sewing Machines either cannot work at all, or, at best very imperfectly.

SUPERIORITY.

over any other Machine in the market will be seen at a glance.

1st It runs easily and rapidly, and is so constructed as to endure all kinds of hard usage.

2d. No breaking of threads in going over seams.

3d. No imperfect action of the feed at uneven places in the work.

4th. The Weed-stitch catches of itself, and will sew from the finest lace to the heaviest leather, and 200 cotton to coarse linen thread.

5th. The Weed Machine will do beautiful quilting on the bare wadding, without using inner lining; thus leaving it soft as if done by hand.

6th. The variety of fancy work that can be done on the

WEED MACHINE,

with so little trouble, makes it equal, if not superior, to six machines combined; for instance, it Binds, Hems, Tucks and Sews on the band at the same time, and inf acc, the

WEED NO. 2 MACHINE,

as before stated, is equivalent to a combination of any six ordinary machines.

Orders for Machines may be sent through the American Advertising Agency 389 Broadway, N. Y.

Below we give a few prices:

No. 2. Oil Black Walnut, Ornamented with Hemmer.	$60,00
No. 2. Oil Black Walnut, Hall Case, Ornamented, with Hemmer.	65,00
No. 3. Extra Oil-Polished Black Walnut, Half Case, Large Table beautifully Ornamented.	75,00

WEED SEWING MACHINE Co.,

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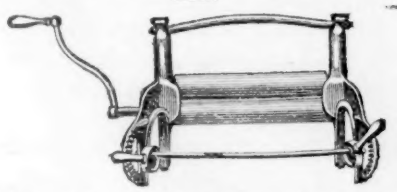
PUTNAM'S CLOTHES WRINGER.

IT IS THE ONLY RELIABLE

Self-Adjusting Wringer.



No Wood-work to Swell or Split. No Thumbscrews to get out of order. Warranted with or without Cog-wheels.

It took the First Premium at Fifty-seven State and County Fairs in 1863, and nearly double that number in 1864, and is, without an exception, the *best* Wringer ever made. Patented in the United States, England, Canada, and Australia. Agents wanted in every town, and in all parts of the world. Energetic agents can make from $3 to $10 per day

WHAT EVERYBODY KNOWS, VIZ.:

That Iron well galvanized *will not rust.*

That a *simple* machine is better than a complicated one.

That a Wringer should be *self-adjusting, durable, and efficient.*

That thumb-screws and fastenings cause *delay* and *trouble* to regulate and keep in order.

That wood soaked in water will *swell, shrink,* and *split.*

That wood-bearings for the shaft to run in *will wear out.*

That the Putnam Wringer, with or without cog wheels, will *not tear the clothes.*

That cog-wheel regulators are not essential.

That the Putnam Wringer has *all* the advantages, and *not one* of the disadvantages above named.

That all who have tried it pronounce it the *best* Wringer ever made.

That it will wring a thread or a bed-quilt *without alteration.*

We might fill the paper with testimonials, but insert only a few to convince the skeptical, if such there be; and we say to all, *test* Putnam's Wringer. Test it *thoroughly* with *any* and any others, and if not entirely satisfactory, return it;

PUTNAM MANUFACTURING CO.—*Gentlemen:* I know from practical experience that iron well galvanized with zinc will not oxydize or rust one particle. The Putnam Wringer is as near perfect as possible, and I can cheerfully recommend it to be the best in use. Respectfully yours,

JOHN W. WHEELER, Cleveland, O.

Many years' experience in the galvanizing business enables me to indorse the above statement in *all particulars.*

JOHN C. LEFFERTS, No. 100 Beekman St.

NEW YORK, *January,* 1864.—We have tested Putnam's Clothes Wringer by practical working, and know that it will do. It is cheap; it is simple; it requires no room, whether at work or at rest; a child can operate it; it does its duty thoroughly; it saves time, and it saves wear and tear. We earnestly advise all who have *much* washing to do, with all intelligent persons who have *any,* to buy this Wringer. It will pay for itself in a year at most. HORACE GREELEY.

PRICES—$8, $9, and $10.

Sample Wringers sent, express paid, on receipt of price.

Manufactured and sold, wholesale and retail, by

PUTNAM MANUF'G CO.,

13 PLATT STREET, New York,

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Gas Heating Apparatus

OF EVERY DESCRIPTION,

Gas Burners, &c.

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Burners for Wood, Coal Oil and Water Gas.

Gas and Lava Burner Tips

Constantly on Hand.

THE AMERICAN METER CO.

Organized under the General Manufacturing Laws of the State of New York

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SAMUEL DOWN, WILLIAM HOPPER, R. H. GRATZ, HENRY CARTWRIGHT, RICHARD MERRIFIELD.

THOMAS C. HOPPER, *Superintendent at Philadelphia.*

This Company is now prepared to furnish WET AND DRY GAS METERS, STATION METERS, GOVERNORS, PRESSURE INDICATORS AND REGISTERS, SERVICE and METER COCKS, and all other articles in their line appertaining to the use of Gas-Works.

The combination of Mechanical and Scientific Skill, and the long experience of the several members of the Company, is a sure guarantee of durability, accuracy and excellence of workmanship. Orders addressed

AMERICAN METER COMPANY,

West Twenty Second Street, New York. Arch and Twenty-Second Streets, Philadelphia. No. 23 West Street, Boston will meet with prompt attention.

Harris & Brother, Practical Gas Meter Manufacturers,

Continue, as heretofore at their old Establishment, No. 1117 CHERRY ST., PHILADELPHIA, to Manufacture

WET AND DRY GAS METERS, and all kinds of GAS APPARATUS, and furnish all articles appertaining to the use of Gas Works. ☞OUR WORK WARRANTED—Satisfaction Guaranteed. Orders respectfully solicted, and promptly attended to, by

HARRIS & BRO., No 1117 Cherry st., Philadelphia.

Messrs. Harris & Brother, Philadelphia Gas Works, February 14, 1857.

Dear Sirs;—I take great pleasure in stating that we have found your meters to register with entire correctness, and to be generally of very good quality—the number furnished by you to these works is over 5,000. John C. Cresson, Engineer;

Office of the Gas Light Company of Augusta, Ga., March 6th, 1858.

This is to certify that having used meters manufactured by Messrs. Harris & Bro., for the last nine years, we do not hesitate to state they have given entire satisfaction in point of wokmanship and accuracy of registration; they are surpassed by none, and equaled by few manufactories in the Union; we have used meters made by other establishments but our preference is in favor of those made by Harris & Bro., of Philadelphia, Pa.

G. S. Hookey, Superintendent of the Gas Light Company of Augusta, Georgia.

Messrs. Harris & Brother, Philadelphia. Philadelphia, March 4, 1858.

Gentlemen—We take great pleasure in bearing our testimony to the very superior character of the meters we have received from your establishment. We have always found the workmanship all we could desire, while the accuracy and reliability of their measurement have always been satisfactory. We have used meters made by other parties, and none have given as entire satisfaction as those received from you. We are, gentlemen, very truly, yours, Birkinbine & Mears.

Messrs. Harris & Brother. March 14, 1857.

Gentlemen—For the last ten years we have used in the Philadelphia Gas Works, meters made in your factory, and take pleasure in expressing my opinion to their correctness. On several occasions I have taken your meters apart, and found the material used in the manufacture of the same, to be as fine quality as is used in those imported from Europe, or made by any of the manufactur in the United States. Respectfully Yours George Wiegand, Inspector of Gas Fittings, Philadelphia

C. GEFRORER,

MANUFACTURER OF GAS BURNERS,

529 Commerce Street, Philadelphia, Pa.

Burners for Wood, Coal Oil, and Water Gas. Brass and Lava Burner Tips Constantly on Hand.

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PIANO FORTE MANUFACTURERS,

499 BROADWAY, NEW YORK.

THE ATTENTION of the public and the trade is invited to our New Scale, Seven Octave, Rosewood Piano-Fortes, which for volume and purity of tone are unrivalled by any that have hitherto offered in this market. They contain all the modern improvements, French Grand Action, Harp Pedal, Iron Frame, Over-strung Bass, etc., and each instrument, being made under the supervision of Mr. J. H. Grovesteen, who has had a practical experience of over thirty years in their manufacture, is fully warranted in every particular.

THE "GROVESTEEN PIANO-FORTE"

RECEIVED THE HIGHEST PREMIUM AT THE

CELEBRATED WORLD'S FAIR.

Where were exhibited instruments from the best makers of London, Paris, Germany, Philadelphia, Baltimore, Boston, and New York; and also at the American Institute for five successive years, the gold and silver medals from both of which can be seen at our warerooms.

By the introduction o f improvement we make a still more perfect Piano-Forte, and by manufacturing largely, with a strictly cash system, are enabled to offer these instruments at a price which will preclude all competition.

PRICES

No. 1,	Seven Octave, round corners, Rosewood, Plain Case,		$300
No. 2,	"	" " Heavy Moulding	325
No. 3,	"	" " Louis XIV style	350

a fac-simile of the accompanying cut.

TERMS—Net Cash, in current funds Descriptive circular sent free on application.

THE AUBIN BALLANCED

VALVE WATER METER,

(Used also for Oils and Liquors)

Is now in use by many City Water Cos., because of its low price, simplicity, durability, accuracy under any pressure, and (a great advantage) because it runs with less head than any meter used. Manufactured by H. Q. HAWLEY, Albany, N. Y.

MORRIS, TASKER & CO.,

PASCAL IRON WORKS

[ESTABLISHED 1821,]

PHILADELPHIA,

Manufacture Wrought Iron Welded Tubes for Gas, Steam or Water; Lap-Welded Boiler Flues, GALVANIZED WROUGHT IRON TUBES,

ARTESIAN WELL PIPES,

of Wrought or Cast-Iron, screwed together, flush inside and out; Gas-works Castings, Retorts and Bench Castings for Coal Gas-works,; Cast-Iron Street Mains, Bends, Branches, Drips, &c.

Gas and Steam Fitters' Tools, &c.

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MERRICK & SONS, Engineers,

MANUFACTURERS OF EVERY DESCRIPTION OF GAS MACHINERY.

Retorts, Bench Castings, Condensers, Washers, Scrubbers, Wet or Dry Lime Purifiers, Coke Wagons, Fire Tools, Wrought Iron Grate Bars, Gasholders, either Telescopic or Single, with Suspension Frames complete; Wrought Iron Roof Frames, for Iron or Slate; Stop Cocks, Exhausters, Steam Pumps, Boilers and Tanks, Steam or Hand Air Pumps for proving Street Mains, Centre Seals, Governors, Wrought or Cast-Iron, Line Sieves for Purifiers, Hoisting Machines for Lifting Purifier Covers.

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5th and Washington Sts, Philadelphia.

S. FULTON & CO.,

(Successors to Colwell & Co..)

Manufacturers of

PIG IRON & CAST IRON GAS & WATER PIPES.

Also, Heavy & Light Castings of every description, No. 207 North Water street and 206 North Wharves, Philadelphia.

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TO GAS COMPANIES.

THE UNDERSIGNED DESIRES TO undertake the supervision of several small Gas-works, to visit and examine them as often as may be necessary; to obtain and inspect their coal, castings, fire-brick, and other materials; and to manage their general business in such a manner that they shall be under such supervision as is now attainable in large works, at much increased cost. Also, to advise as general Consulting Engineer and expert in practical chemistry.

CHAS. M. CRESSON,
Late Asst. Engineer of the Philadelphia Gas-works
417 Walnut st., Philadelphia.

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NEW PATENT

GAS APPARATUS

For Country Residences, Public Buildings, &c.,

FROM $300 UPWARDS.

EVERY DESCRIPTION OF GAS FIXTURES.

Gas Fitting in all its branches

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THE WOODWARD
Steam Pump Manufacturing Company,

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SAFETY STEAM PUMP,

—Adapted for Mining and Fire Purposes—and

Steam, Water & Gas Fittings of All Kinds.

Also, Wholesale and Retail Dealers in WROUGHT IRON PIPE, BOILER TUBES, etc.,

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JOSEPH LENNIG,

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MANUFACTURER OF

Wet and Dry Gas Meters,

STATION, SHOW, & EXPERIMENTAL METERS,

Photometers, Pressure Registers, Indicators, and Gauges, Governors, Meter Provers, Centre Seals, Fluid Gauges, &c.

GAS APPARATUS

Of the most reliable and approved construction manufactured and on hand at the

UNION GAS METER WORKS.

R. D. WOOD & CO.,

MANUFACTURERS OF

CAST-IRON PIPE, RETORTS, &c.

Office, 400 Chestnut Street,

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FINKLE & LYON'S

New Family

SEWING MACHINE

Should be known in

IN EVERY TOWN.

To accomplish this at once and save the expense of a *Travelling Agent*, we offer thus, viz:

Any one sending us orders for two machines shall receive one machine free of charge. This proposition cannot avail after we have appointed a local agent in the town.

We have now completed our *new manufacture* at a cost of some $200,000—introducing *new patents*, and such important improvements, that without fear we are able to offer the following stringent guarantee, viz: After a fair trial, if any purchaser does not prefer the FINKLE & LYON FAMILY SEWING MACHINE to any other, he can return it and have back his money.

This machine has taken many of the HIGHEST PRIZES; *is less complicated than any other first class machine; does a wider range of work without changing; requires no taking apart to clean or oil, no "lessons" to set needle, regulate tension or operate machine.*

Our new Manufacturing Machine is sold on the same terms as the Family Machine.

Please send for a circular with samples of sewing.

Finkle & Lyon S. M. Co.
No. 561 BROADWAY, NEW YORK.

Great Improvement

IN

Sewing Machines.

EMPIRE

SHUTTLE MACHINE!

Patented February 14th, 1860.

Salsroom, 536 Broadway.

This Machine is constructed on entirely new principles of mechanism, possessing many rare and valuable improvements, having been examined by the most profound experts, and pronounced to be SIMPLICITY and PERFECTION COMBINED.

It has a straight needle, perpendicular action, makes the LOCK or SHUTTLE STITCH, which will NEITHER RIP nor RAVEL, and is alike on both sides; performs perfect sewing on every description of material, from Leather to the finest Nansook Muslin, with cotton, linen, or silk thread, from the coarsest to the finest numbers.

Having neither CAM nor COG WHEEL, and the least possible friction, it runs as smooth as glass, and is

Emphatically a Noiseless Machine!

PRICE OF MACHINES,

COMPLETE:

No. 1, Family Machine, with Hemmer, Feller, Gauge, Braider, & Corder, complete. - - - $60
No. 2. Small Manufacturing, with Extension Table, $75
No. 3. Large Manufacturing, with Extension Table, $85
No 3. Large Manufacturing, for Leather, with Rolling Foot and Oil Cup, 100

One-half hour's instructions is sufficient to enable any person to work this Machine to their entire satisfaction.

Agents Wanted in all Towns in the United States, where Agents are not already established. Also, for Cuba, Mexico, Central and South America, to whom a liberal discount will be given Terms, invariably CASH on delivery.

T. J. McARTHUR & CO.,

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GAS-BURNERS.

WIGHTMAN BROS.,

IMPORTERS AND

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For the United States and Canada, of

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GERMAN LAVA GAS-TIPS

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LAVA TIP GAS BURNERS,

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And Importer of SCOTCH TIPS,

336 and 338 West 21st street,

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Mercury Cups, Portable Sockets, Burner Pillars, Burner Pliers, &c., &c.

C. GEFRORER,

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GAS-BURNERS,

For Lighting and Heating Purposes.

GAS HEATING AND COOKING APPARATUS; FITTERS' ROVING APPARATUS, &c.

529 Commerce st., bet. Market & Arch, Philadelphia

JOSEPH LEES,

Sole Agent for the sale of

Thompson's Gas Controller

in the States of

CALIFORNIA AND OREGON,

San Francisco, Cal.

LOUISVILLE PIPE WORKS.

Dennis Long, Proprietor.

Cast Iron Gas and Water Pipe of All Sizes Always on Hand.

Retorts.

STOP-VALVES, AND ALL APPURTENANCES FOR EITHER GAS OR WATER WORKS.

All Pipe, &c., Made of the Very Latest Pattern and Improvements.

ALSO MANUFACTURER OF

Steamboat, Portable and Stationery "STEAM ENGINES."

Flour and Saw Mill Machinery—Portable Circular Saw Mills, Shafting, Pulleys, &c., &c.

186-1y DENNIS LONG,
Cor. 9th and Water streets, Louisville, Ky.

Experimental Trial of Safety Lamps.

Some highly important experiments for the purpose of testing the relative value of the different kinds of safety lamps, when exposed to a current of air and explosive gas, took place at the Barnsley Gas Works, and were conducted by Mr. Hutchinson, the manager, and Mr. Wilson, steward of Darfield Main Colliery. For the purpose of the experiments a rectangular box, about 12 feet long and 11 inches by 4 inches inside, was attached to the flue of the retort house chimney, the draft being 3-10ths of an inch as indicated by the water guage, and by the anemometer was found to travel at the rate of five miles an hour, when regulated by a damper. Inside the box was a glass sight-hole, opposite to which the lamp to be tested was placed. When all was in readiness a stream of gas was allowed to flow into the box sufficient to surround the lamp with an explosive atmosphere. The different lamps were then tested with the following results:—The Davy lamp, with the shield on the outside, exploded in 6 seconds; and with the shield inside the gauze gas exploded in 9 seconds. The Belgian lamp exploded in 10 seconds; the Mizard in 10 seconds; the small Clany in 10 seconds; the large Clany in 7 seconds; and the Stephenson in 75 seconds The last is, of course, by far the best, the glass cracking before going off. It will, however, be seen that none of the so-called safety lamps can be depended on when coming in contact with a strong explosive current of fire-damp and air, but are in reality mere indicators of danger, it being clearly demonstrated that all lamps will explode the gas when the mixture is sufficiently strong—*Me. Mag.*

London Underground Railway.

A coroner's jury has condemned the atmosphere of the underground railway. They do not go the length of a verdict of manslaughter, but they say that the atmosphere accelerated the death of a woman named Dobner, who resided at Eton. She traveled from King's Cross to Bishop's road, and on reaching the latter station was taken ill and died suddenly. One of the surgeons who made the *post mortem* examination, said she was laboring under disease of the bronchial gland, and undoubtedly the soffocating air of the underground railway had accelerated death. The coroner said he had experienced the depressing effect of that railway, and therefore avoided it as much as possible. The tunnels and stations should be ventilated, but he supposed that would not be done until some shocking loss of life from suffocation had occurred. The only underground system of railroading by which good fresh air may at all times be enjoyed is the Pneumatic plan The cars being propelled by atmospheric pressure, it is only necessary to open a ventilating valve in the car in order to admit just the desired quantity of air, which is always pure, as there are no cinders or foul gases present. The air rushes like a hurricane the pneumatic tunnel, always keeping the interior walls dry and sweet.

What is Petroleum?

The crude petroleum of Pennsylvania always issues up out of the earth mixed with inflammable gas. This gas makes an excellent fuel, and is much used for generating steam for the pumping engines. It is abundant enough to run all the engines in the oil district.

If the gas as it issues out of the wells be subjected to pressure, or to a temperature of zero, a considerable percentage of it will be condensed into a liquid, the amount condensed being somewhat proportioned to the pressure and cold. Some of it, however, refuses to condense at any pressure and cold which we command, and such is, consequently, a permanent gas. That which condenses assumes the form of gas again as soon as the pressure is removed and it is exposed to the ordinary temperatures. The change into gas or vapor is very rapid and violent, and in fact is a case of boiling. Some of the volatile liquids will boil on ice.

It is evident from these statements that petroleum gas is in fact a mixture of several gases and vapors, which may be separated from each other by careful management of pressure and cold.

We may likewise demonstrate the fact that the liquid crude petroleum is a mixture of different liquids. The partial separation of these may readily be effected by distillation. The oil which first appears on distillation is very light in gravity and has a low boiling point. As the distillation progresses the gravity and boiling point increase with remarkable regularity; from the beginning to the end there appears to be a constant and regular progression.

The reader is now prepared to apprehend the fact that petroleum is composed of a series of substances having properties which differ from each other only in degree. There is a beginning and an end, a top and bottom of the series, and between them regular gradations of intermediates. The beginning or top of the series is a permanent gas; the bottom or end is a solid. Between these are gradations of consistency, gravity, and volatility. In an arithmetical or geometrical series there is always a peculiar difference between consecutive members of the series; given one member of the series and that peculiar difference, and the whole series may be determined, or any particular member of it. Is there any such certain or interesting relation between members of the petroleum series?

The only chemical elements which enter into petroleum are carbon (C_2) and hydrogen (H_4). (Water, sulphur, nitrogen, compounds, etc., which are often found in crude petroleum, are properly regarded as foreign substances). Now it is evident that the members of the series must differ by varying proportions of these elements—there must be progressive increase of one over the other.

The beginning of the series has been found to be composed of two atoms of carbon (C_2) with four atoms of hydrogen (H_4); the beginning of the series is represented thus—$C_2 H_4$. Now it happens that this substance $C_2 H_4$ to chemists is a familiar acquaintance. It is commonly known under the name of marsh gas, and it is known to coal mines as fire damp. The second member of the series is $C_4 H_6$, and the third is $C_6 H_8$. The reader hardly need to be told that the fourth is $C_8 H_{10}$, and he is able to determine the twentieth. The common difference of the series is $C_2 H_2$, and the general formula for the series is $C_2 + H^{n+2}$.

We append a table showing the specific gravity and boiling point of a part of the series. The first four are gaseous at ordinary temperatures, and the specific gravities are given in comparison with air:

			Specific gravity.	Boiling gravity.
1	C_2	H_4	0.554	..
2	C_4	H_6	1.04	..
3	C_6	H_8	1.52	..
4	C_8	H_{10}	2.01	32°
5	C_{10}	H_{12}	.628	86°
6	C_{12}	H_{14}	.669	158°
7	C_{14}	H_{16}	.699	198°
8	C_{16}	H_{18}	.726	243°
9	C_{18}	H_{20}	.747	278°
10	C_{20}	H_{22}	.757	321°
11	C_{22}	H_{24}	.766	359°
12	C_{24}	H_{26}	.766	408°
13	O_{26}	H_{28}	.792	423°
14	C_{28}	H_{30}	.800	460°
15	C_{30}	H_{32}	..	496°
15	C_{32}	H_{34}	..	527°
17	C_{34}	H_{36}	.825	..
25	Paraffine		.870	..

—*Scientific American.*

Mining Share Market.

The San Francisco Weekly Stock Circular of August 10, gives the market rates of mining stock as follows:

The mining share market, since our last reference has been exceedingly depressed, most shares falling much below our previous quotations. Want of confidence seemed to pervade all dealers, and during the past week the investments have been mostly made for speculative puryoses, though even on this account the demands have not been very pressing. Fear took possession of timid holders, and the purchases made one day were sacrificed in many instances at an enormous discount the succeeding day. The demand at the close to obtain shares at a low figure has stimulated the market considerably, and a few stocks have stiffened somewhat. A number of companies have already announced their usual monthly dividends, and so far as we have been able to ascertain, the bullion product of the companies usually embraced in our statements, which is a true index of the condition of the Comstock Lode, has been $1,475,000 in July, against $1,438,367 in the preceding month.

HALE & NORCROSS—Continues out of the market; offered at $3,000 per foot.

CROWN POINT—Was in less favor early in the week at a decline, gradually receding from $1,035 to $900, and closing at $1,290. The bullion returns in July show a yield of about $117,000 against $77,550 in June.

YELLOW JACKET—Has fluctuated considerably, opening at $1,060 advancing to $1,110, dropping to $985, then selling at $1,075, and closing at $1,085. It is said that a fair body of ore 18 feet wide, has been developed above the 700-foot level to the north, with good indications as to the probable extent.

GOULD & CURRY—Has been in less favor at a considerable recession, declining from $665 to $530, and closing at $540.

CHOLLAR-POTOSI—Has been somewhat inquired for at declining rates, receding from $415 to $330, improving to $366, and closing at $364.

KENTUCK—Participated in the general decline, opening at $350@365, falling to $305, then selling at $285, ex-dividend. A dividend of $40 per share is payable since the 8th inst.

IMPERIAL—Receded from $203 to $180, rallied to $185, and closed yesterday at $176. No change in the mine or mills.

OVERMAN—Was one of the principal features of the week in stock circles, selling quite extensively at variable rates, opening at $90, dropping to $47.50, gradually improving to $106, and closing at $75.

OPHIR—Has been less active, receding from $110 to $95, and closing yesterday at $100.

CONFIDENCE—Sold within a range of $60@$65.... ALPHA—a few feet sold at $100 ...BELCHER advanced from $165 to $235....SIERRA NEVADA advanced from $25 to $45, sold at $35, and closed at $40....EMPIRE sold uniformly at $180.

The aggregate sales of stocks, legal tender notes, etc. since Saturday last, amounted to $1,229,880.

WATER PUMPED.—The statement below shows the operations of the Philadelphia Water Works during the month of July:

	Galls. water pumped during month.	Ave No. of gals. pr day.
Fairmount	743,042,085	23,960,123
Schuylkill	244,314,900	7,881,125
Delaware	41,019,940	2,929,995
Twenty-fourth ward	71,051,940	2,291,998
Germantown	18,150,800	627,241
	1,117,580,,665	37, 744,497

The average quantity of water pumped daily in Philadelphia in 1866 was 29,080,393 gallons.

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☞ All communications to be addressed to "The Editors," No 22 Pine Street, New York.

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